The ELECTRICAL REVIEW

FOUNDED 1872

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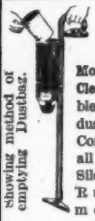

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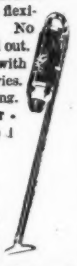

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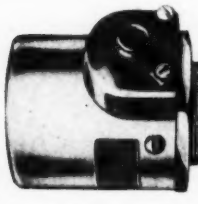

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The
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High-voltage Cables

AS transmission voltages increase, so do the electrical properties of cables assume greater importance in relation to the mechanical. The rating of cables of the highest practicable voltage which was once decided by the heat generated by current in the conductor now depends also upon the dielectric loss, which at lower loadings may be quite as much as the C^2R loss.

Soon after 33-kV cables came into common use, some ten or twelve years ago, a major cause of cable breakdown was recognised to be the ionisation of occluded gases in voids in the insulation, a measure of which was provided by rise in power factor with applied voltage. These voids are left by the migration of impregnating compound under the influence of expansion and contraction of the cable with temperatures due to varying load.

Several methods have been devised to prevent the destruction of the paper dielectric by ionisation, and these have been discussed in the ELECTRICAL REVIEW from time to time. In one type described by Mr. P. V. Hunter the conductors and the core insulation are oval, the axial adjustments with heating and cooling being opposite and mutually compensatory. Most developments in this direction, however, are based upon the filling of the spaces with fluid, which is not subject to destructive ionisation, the earliest of which was the Pirelli oil-filled cable as used for short sections of the 132-kV grid as well as at lower voltages.

In more recent developments gas under pressure has been employed in different ways. The first, the "pressure cable" (accounts of which were published by the late Dr. E. Bowden and others), which departs very little in design from the standard type, is run in a steel pipe containing gas which exerts a pressure entirely on the outside of the lead sheath. In another, the "gas-filled cable," of which Mr. C. J. Beaver has written in these columns, the designed gaseous conditions, and thereby the stability of the dielectric, are maintained by enclosing the gas spaces between the convolutions of the impregnating paper.

A third type, due to Dr. P. Dunsheath, is the "gas-cushion" cable, the main particulars of which are given in this issue. The gas pressure in this case is applied radially at every point, so the compound has a very little way to travel during expansion and contraction. Tests have not yet been completed on the 150-kV cables that have been made, but the results obtained with 33- and 66-kV lengths show that no risk of instability need be anticipated.

It can safely be said that the high-voltage cables of the types discussed here have, each in its own way, overcome the old difficulties due to ionisation—and that with a margin which can be accurately predetermined. They are also capable of carrying greater currents than cables of the conventional type, and have other advantages that should lead to a general reduction in the overall cost of underground transmission.

Lord Hirst's Review

THE three principal causes which contributed to the increased profits of the General Electric Co., as stated by Lord Hirst at last Friday's meeting of the company were: better conditions at home, with a resulting rise in the purchasing power of the people; better export trade; and improvements within the electrical industry itself. Though the export trade statistics showed substantial advance, they were not yet back at the high standard of 1929-1930, but the company increased its trade in all markets except France and China, where economic conditions were unsatisfactory. The speaker, after remarking that more and more of our goods were going to the British Empire, commented upon the spectacular expansion that had been, and was still, taking place in the telephone service at home; he also uttered a word of warning concerning the harm that would follow if through the claims of too-ardent

enthusiasts the public were led to entertain exaggerated expectations regarding television. The difference, in this connection, between laboratory achievement and the establishment of a national service is great. Figures were quoted to show how the electrical industry is contributing to the well-being of other industries, instead of operating at their expense as some are inclined fallaciously to assert; in wages alone the company spent nearly £4,000,000. The great scope presented by such districts as Birmingham, Manchester, Glasgow, and Liverpool for suburban railway electrification should incline the Government to give further encouragement in this direction. Such conversions would bring enormous benefit to the basic industries, but from the recently approved scheme (£35,000,000) only four or five million pounds worth of business will come directly to the electrical industry. The speech as a whole was a moderately phrased but hopeful survey of the situation.

W. T. Henley's Meeting

THE record low level of prices for commodities such as copper and lead means, of course, a lower cash turnover to a cable company, as Sir Montague Hughman explained to shareholders of W. T. Henley's Telegraph Works Co. last week; but he was able to inform them that there were now prospects of these prices increasing. So far as employment was concerned, the numbers were even better than reported a year ago, when they constituted a record for fourteen years. Works extensions have been made at North Woolwich to improve existing manufacturing conditions, and to give larger productive capacity to meet growing demands for rubber cables. The speaker mentioned the company's activities in connection with the gas-cushion h.v. cable to which we refer in our leading article. He also alluded to the formation of the new subsidiary—the Holborn Construction Co.—which is carrying out small bridge reconstruction, substation construction, and other work, which will enable Henley's to retain the services of its civil engineers on the contract staff when other business for which they are qualified is slack.

I.E.E. Overseas Members

THE Conversazioni of Overseas Members held by the Institution of Electrical Engineers are pleasingly informal, those present making themselves known to one another without awaiting more conventional introductions. In this they are helped by the badges displaying the name and country of each guest which can be obtained on arrival at the Institution. In addition to the social forgathering at this year's function on July 11th, after the reception by the President, Professor W. M. Thornton, and the Council at 8.30 p.m., short lectures will be given. Mr. H. R. Harper will speak on "Brown Coal Developments in Victoria" and Mr. R. A. Watson-Watt on "The Cathode-Ray Oscillograph," and there will be demonstrations of electrical interest.

Mr. Seabrook's Appointment

WHILE we have always had close to our hearts the best interests of the Electrical Industries Benevolent Association we have hesitated to weary the reader and therefore the actual or potential subscriber with too frequent references to its appeals. We feel, however, that everybody will be interested in the new plans that have been decided upon by the Executive Committee for rendering its activities both more extensive and more effective. Captain J. T. Keeping, the general secretary, has his hands full with the general affairs of the Association, and it is necessary to have a member of the electrical industry specially set apart for the development of the propaganda plan of the committee. We are informed that Mr. A. Hugh Seabrook, M.I.E.E., who should not require any introduction after all his West Ham, Marylebone and other history, has been appointed "Executive Officer" to do the new work and he will begin at once. Mr. Justus Eck, the honorary secretary, sends us a lengthy communication announcing this fact. The new appointment is not due to any failure to appreciate the value of the service which the organisation has long received from honorary workers. It is made in the belief that consistent and continuous effort by a vigorous personality will secure larger membership and bigger income, enabling the Fund more adequately to shoulder its legitimate responsibilities.

Self-Help

THE voluntary grouping of the smaller undertakings has often been advocated as a means of securing more suitable distribution areas. Two days ago the city of Ripon set a good example by handing over its electricity supply powers to Harrogate Corporation. The smaller undertaking had previously taken a bulk supply from the other, but it was decided that the interests of its consumers would be better served by complete amalgamation. In return for giving up their "independence," the Ripon consumers are to receive an immediate reduction in prices and in two years to enjoy the same terms as those in Harrogate. This is in line with the policy pursued by Mr. Neil McLean, the borough electrical engineer, in the several extensions made since 1928 to the Harrogate supply area.

High Load Factors

THE proposals put forward by Mr. George Wilkinson on another page that a lower grid running charge should be quoted for off-peak loads is unorthodox in that the true running costs of electricity used for any purpose is the same at any time. However, tariffs are not the same as costs, and many undertakings now offer a lower running charge without a fixed charge in order to encourage the use by night of domestic water heaters, for example. The fallacy formerly implied in the view that standing charges remained at the same total figure whatever the load factor is not now operative. The meeting of a continuous unvarying demand at one time called for a greater margin of spare plant, as sets could not so easily be shut down for seasonal overhaul and minor adjustments, but the grid has altered all this.

The Supply Regulations

A QUESTION of principle has been raised by the Joint Electricity Authorities in relation to one of the alterations in the Supply Regulations that are now under discussion. The revision proposed by the Electricity Commissioners would definitely prohibit the giving of a supply to an unsafe neon sign. The J.E.A.s expressed the view that it is primarily the duty of the consumer and not of the undertaking to secure compliance with the Regulations; this would still hold even if the amendment applied to signs erected with the undertaking's knowledge. The differentiation between signs and other parts of the installation that may be unsafe seems illogical. On the other hand the consumer is becoming more and more inclined to regard the undertaking as morally bound to to keep him right in such matters. Another amendment considered would require the undertaking to notify the Commissioners of any widespread failure of supply. The desirability of this was discussed by us on April 26th, and we think the J.E.A.s did well to agree with the proposal.

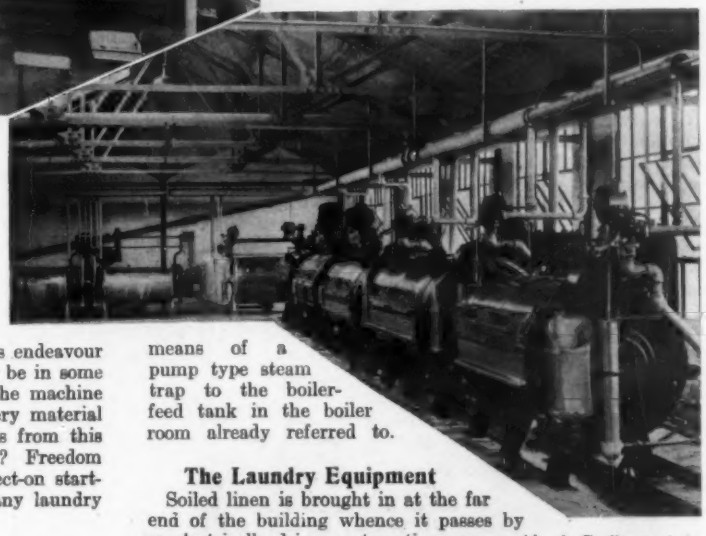
Good News from Argentina

LIKE other countries Argentina has been hard hit during the past five years by the world economic depression so it is good to read in the Department of Overseas Trade report by Mr. Stanley G. Irving, C.M.G. (see page 19 of this issue), that the general prospects of the market from the electrical point of view are distinctly promising. At present many of Great Britain's most serious competitors, including the United States and Japan, are considerably handicapped by the exchange conditions, and by being satisfied with lower profits British manufacturers have recently been securing quite a fair share of the available orders.

Laundry Power and Equipment

Why private generating plant is installed

THE success of a laundry establishment depends largely upon the goodwill that is created by the building up of a reputation for speed of operation and service. The employment of modern machinery undoubtedly is an important contributory factor, but modernity demands the utilisation of three-phase a.c., without which the necessary degrees of facility in motor operation and of convenience in automatic control could not easily be achieved.

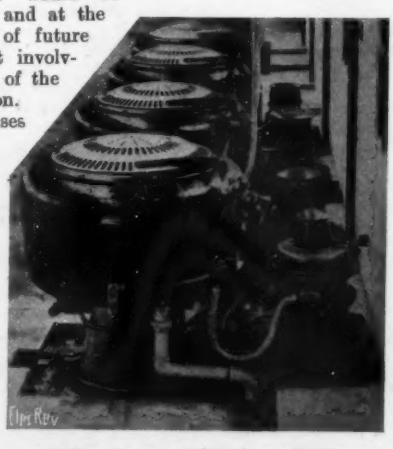


Left: The finishing department of the Tyne Main Laundry. Right: A section of the washhouse, Queensway Laundry, Ponders End

Laundry machines, both large and small, are commonly driven by multiple motors, individually of relatively small sizes. Also, too frequently it would seem, restrictions are placed upon the starting currents permitted to be drawn from public supply mains, and in his endeavour to comply with this limitation (desirable as it may be in some instances, though not always strictly necessary) the machine maker has to provide slip-ring motors. Is the very material increase in cost of the driven plant which results from this combination of circumstances properly appreciated? Freedom to fit plain squirrel-cage motors, arranged for direct-on starting, should in many cases reduce the cost of many laundry machines by nearly one quarter.

The Tyne Main Laundry

This recently established concern is affiliated with the coal-marketing company of the same name, whose object is to offer another household service to its many customers in the greater London area. The buildings at Brentford have been laid out with foresight as the smallest completely self-contained unit that would be initially economic and at the same time allow of future extensions without involving any alteration of the power plant section. The latter houses two steam-electric generating sets, one of them at present serving as a stand-by set. The installation of this private plant in duplicate is said to have been cheaper than the purchase of electricity from public mains at the price quoted locally. Incidentally, the company has thereby acquired a means of utilising profitably some of the coal dust which it is unable to use otherwise.



A group of motor-driven extractors

The boiler house contains one 8 ft. by 14 ft. Davey Paxman self-contained "Economic" boiler designed to work at 180 lb. per sq. in. with sufficient space for the accommodation of another boiler of similar capacity to be erected parallel with it.

In the boiler house are also feed-water pumps and a boiler-feed tank designed to receive the condensate from all the steam equipment in the laundry. The generating room is at present equipped with two 50-kW alternators (Lancashire Dynamo & Crypto) generating at 400 V, 3-phase, 50 cycles and driven direct at 600 r.p.m. by vertical high-speed compound steam engines (W. H. Allen, Sons & Co.). A generator control panel is also housed in this room and includes an Isenthal automatic voltage regulator working in conjunction with pilot exciters driven in tandem with the main exciters directly from each generating set.

Hot and cold water tanks and a "Permutit" water softener are adjacent to the engine room. The cold water tank of 10,000-gall. capacity is mounted on the top of a steel structure, the hot water tank (3,000 gall.) being below. Connected by thermo syphon with the latter tank is a steam heater which enables all the hot water required by the laundry to be heated by the exhaust from the engines. The condensed steam from the exhaust heater is raised by means of a pump type steam trap to the boiler-feed tank in the boiler room already referred to.

The Laundry Equipment

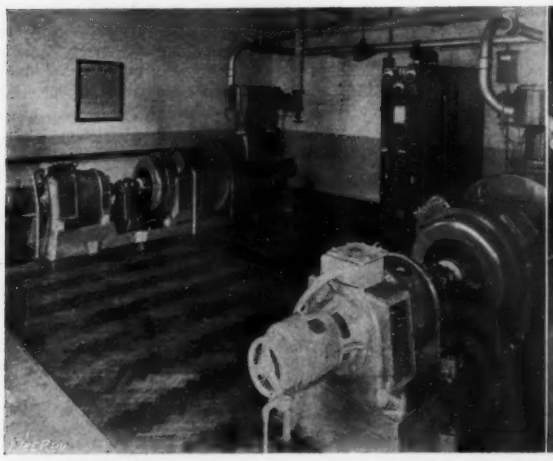
Soiled linen is brought in at the far end of the building whence it passes by an electrically driven automatic conveyor (A. & C. Jenner) to the washhouse. This is equipped with a number of washing machines of the "Utex" and "Champion Cascade" types and of various capacities. Each is driven by its own motor of 0.75 or 1 h.p., geared as required, and controlled by Igranic (Cutler-Hammer type) push-button and limit switches in addition to "Washometers" (Huebsch Mfg. Co.) by means of which the length of the washing period can be pre-set.

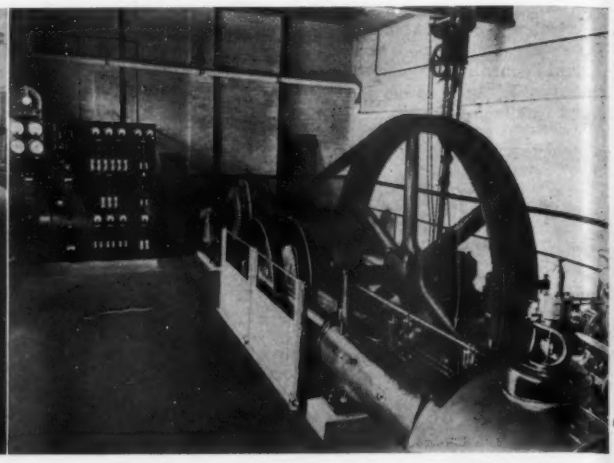
These washing machines are constructed entirely of monel metal, which is used for this purpose because, in spite of its high cost, it is the only metal which combines the required mechanical strength with immunity from chemical action. The cylinder of each washing machine must not only run at a definite speed, but must also be reversed at certain time intervals and must make an absolutely equal number of revolutions in each direction. This cycle of operation is ensured by means of a special switch panel stack which incorporates a rotating drum-type of controller for each washing machine motor. The controller drums themselves are each driven by a small pilot motor. With this arrangement not only are the above conditions completely satisfied, but it is obviously easy to arrange that no two machines can start or reverse at the same time, thus enabling a very good load factor to be maintained.

After the "work" is washed and rinsed and is removed from the washing machines, it is, of course, saturated with water, the greater proportion of which is removed by centrifugal force in hydro extractors. Each machine is driven electrically by an independent vertical motor of 3 to 5 h.p., geared through a short horizontal shaft and specially designed to give a very high starting torque to bring the machine rapidly up to full speed. The work, after leaving the washhouse, passes in a direct line to a classification table where it is sorted into groups for final finishing. Flatwork is ironed on a "Sixroll" ironer (British Laundry Machinery Co.) assisted by a "Decouden" ironer (Manlove Alliott & Co.). The former machine is driven by a variable speed change-pole motor with a drum-type controller which enables the speed of ironing to be adjusted to the class of work being dealt with. It is steam heated and a motor driven exhauster fan removes

the moist vapour given off while the machine is operating.

Bath towels and similar articles requiring a soft and fluffy finish are dried in an "Ultra Speed" tumbler, a machine capable of drying 120 lb. of laundry work in fifteen minutes.



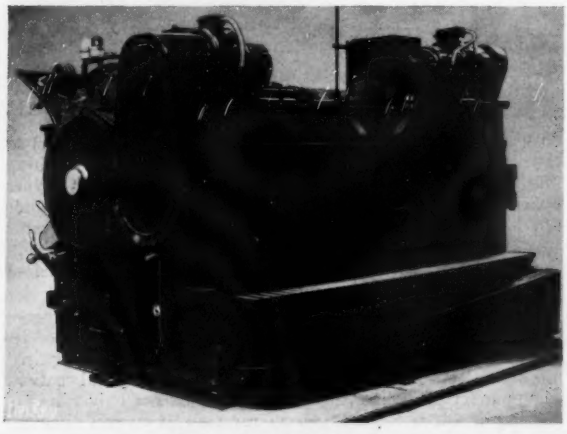


Left: General view of power plant at Tyne Main Laundry. Right: Plant at Belvedere Lodge Laundry

It has two motors, one of which is of the reversing type for driving the cylinder, while the other drives the five air-circulating fans. It is steam heated and temperature control is automatic.

Incidentally, the use of steam distributed at a pressure of 100 lb. per sq. in. for heating the finishing machines automatically restricts the temperature attainable to 338 deg. F., which happens to be the highest temperature at which textile materials can be processed without risk of scorching.

Body linen and shirts are finished on pressers of various types, all specially designed and shaped for particular types of garment. These presses are steam heated and operated by compressed air, the motor driven air compressor for which is



Rear view of an "Ultra-Speed" drying tumbler, showing fan, reversing motor and electrical control

situated in the generating room. Handkerchiefs go through this laundry undisfigured by identification marks. They are washed in nets and ironed on a machine designed to separate each customer's work automatically. This 0.4 h.p. motor driven machine has an Igranic auto-controller and a 1/20 h.p. motor driven fan for removing moisture.

Other equipment includes a ½ h.p. starching tub and a number of G.E.C. "Magnet" electric flat irons with connecting flexes pendent from spring controlled ball joint arms. A number of electrically driven Singer sewing machines are used for identification marking and renovating garments and linen. All this equipment was supplied by, or through, the British Laundry Machinery Co., Ltd., with Igranic switchgear and automatic controllers.

Operational Statistics

The Belvedere Lodge Laundry, Brixton, is another case in which the British Laundry Machinery Co., Ltd., found it necessary to advise the installation of private generating plant for operating three-phase machinery as the better alternative to the purchase of a single-phase supply from public mains. Accordingly a horizontal low-speed steam engine of the drop valve type has been installed to drive a 150-kVA B.T.H. alternator by means of a "vee-flat" rope belt, which method was chosen on account of space restriction and the big difference between the diameters of the two pulleys. When the diameter of the driving flywheel is three or more times that of the driven pulley it is considered good engineering to groove the smaller for a "vee" belt, but to leave the larger pulley flat in the normal way.

In this laundry during one typical week the water used to wash 1 lb. (dry weight) of goods is 4.1 gall., of which 2.35 gall., or 57.5 per cent., is hot. The coal used amounts to 18 tons at 18s. per ton, of which 11.925 tons is for electricity generation, or 4.87 cwt. per hour, or 0.504 lb. of coal per 1 lb. laundered, or 6.3 lb. of steam raised per 1 lb. of coal consumed. The electricity consumed amounts to 1,407 kWh for laundry and 1,188 kWh for auxiliary purposes, or 0.053 kWh per 1 lb. laundered. A total of 140,140 kWh is generated per annum at a gross cost of 1.97d. per kWh. The saving effected by utilising exhaust steam for heating the process water reduces the generating cost to 0.97d. per kWh produced.

The hot water used per hour amounts to 1,230 gall., to raise which from 50 deg. to 160 deg. F. requires 1,592 lb. of exhaust steam, whereas 3,372 lb. per hour is available from the generating engines. About 500 lb. (dry weight) of goods is being laundered per hour, but the washroom equipment is capable of dealing with 866 lb. per hour. A 60 per cent. increase in output would require, say, 50 per cent. more electricity generated by the same plant, which would result in a 33⅓ reduction of the net cost of production, thus making it 0.65d. per kWh generated, the cost of pumping, &c., also falling proportionately.

Television in the Cinema

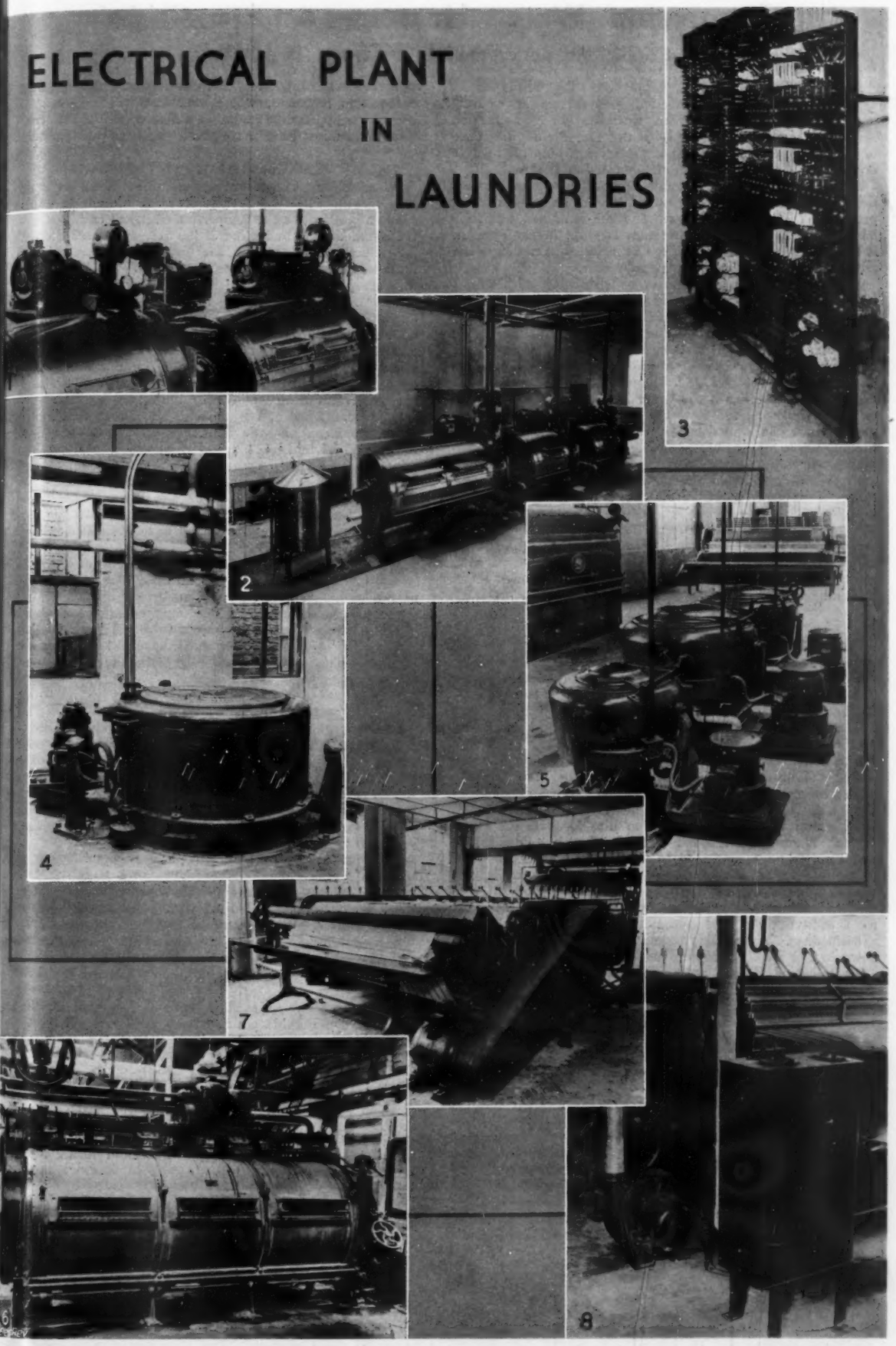
AT last week's conference of the Cinematograph Exhibitors' Association at Cardiff, Capt. A. G. D. West, technical director of Baird Television, Ltd., delivered a lengthy address and demonstrated the reproduction on a full-sized cinema screen of indoor and outdoor scenes and extracts from films transmitted by television.

Capt. West described the more important methods of scanning, remarking that the intermediate film method was extremely flexible. Its running cost was £12 per hour. The use of an electron camera made it possible, simply by turning a knob, to vary the number of lines from 100 to 700, which was quite impossible with mechanical scanners. At present it was not possible to transmit more than 240 lines with effective definition owing to limitations of the radio link.

The best wavelength to use was of the order of seven metres and the amplifiers must respond to a frequency range of from 10 cycles to 2 million cycles; twenty transmitters could be fitted into a wave band of 5 to 10 metres without interfering with each other. Within the last few months cables had been developed capable of transmitting high definition television over distances of 10, 20 or even 100 miles. They consisted of a metallic tubular casing of 2 or 3 in. diameter with a thin conductor down the centre of the tube. Besides television signals they could be used for carrying up to 100 telephone conversations simultaneously. The cost of such cables was variously estimated at from £300 to £1,000 per mile as laid. Already work had started on laying a cable between Berlin and Frankfort and on another between New York and Washington.

Means of reconstituting the picture included the cathode-ray tube, which was now made large enough to give a picture measuring 13 in. by 10 in. The 18-valve Baird receiver produced a 12 in. by 9 in. picture. Of the several methods of producing large-screen pictures for cinema theatres, Capt. West had most hope for the intermediate film method.

ELECTRICAL PLANT IN LAUNDRIES



1. Washing machine motor drive and automatic control devices. 2. Monel metal washing machines at Tyne Main Laundry. 3. Reversing control panel, for washers, extractors and "Ultra Speed" tumbler at Tyne Main Laundry. 4. A 48-in. dia. extractor with vertical slip-ring motor and V-rope drive. 5. Group of motor-driven centrifugal hydro extractors. 6. Large monel metal washing machine at Belvedere Lodge Laundry, inner cylinder, 40 in. x 126 in., showing overhead shafting displaced by individual drives. 7. Six-roll flatwork ironer, showing change-pole motor drive. 8. Controller for change-pole motor and steam-exhausting fan.

Immersion Water Heaters. By Eric Chisholm

Conditions under which their use is justified

AS a sales engineer of a supply company which carries out many highly successful conversions of existing water-heating installations with the aid of immersion heaters, I have been puzzled by the remarkable difference of opinion which exists among engineers regarding the relative merits of self-contained units and immersion heaters.

While some of the arguments against immersion heaters bear investigation, others are not based on efficient and properly designed conversions. The self-contained unit also has certain disadvantages, and that is why, in my opinion, it is not a question of which type to install, but rather which is the most suitable in any particular case.

Many engineers entrusted with water-heating sales will, I feel sure, agree with me that Mr. F. C. Smith, in his article in the ELECTRICAL REVIEW of January 25th, is a little hard on the immersion-heater installation. After all, there are good and comparatively bad self-contained units, and it is only fair to compare a good self-contained unit with a properly designed and properly installed immersion heater.

Now that the value of the water heater as a first-class load is so generally realised it is the duty of a supply authority to appoint a consumers' engineer with a good knowledge of the subject to inspect and approve (or disapprove) all installations before connection to mains. One London supply company will offer halfpenny units for water heating only where proper attention is given to the size of heater in relation to capacity of tank, thermostatic control, lagging and earthing. I have personally installed some hundreds of water heaters, yet I can honestly say I have rarely seen two consecutive installations the same in every respect; that is why I shall always retain an open mind on a matter that causes many a friendly argument.

Price the Primary Consideration

But for the immersion heater there would be many houses in my own district without any form of electric water heating, yet Mr. Smith says that " in spite of low capital expenditure it is doubtful if such installations are, in the long run, to the best advantage of both consumer and supply authority." This statement almost answers itself, as price is, unfortunately, nearly always the primary consideration, and my experience has shown that a self-contained unit installed costs the consumer £15 or £16 for a storage capacity of 11 to 15 gal., whilst the conversion of the tank already fitted in his linen cupboard, with a 2-kW immersion heater, thermostat, efficient lagging and wiring, can be sold to him for half the above prices. Where taps are fed from the boiler " flow " pipe and have to be reconnected to the top of the tank a small plumbing charge is made, but even then the price is considerably below that of the self-contained unit job. Even if the radiation loss is a little higher the additional cost of £8 for a self-contained heater would allow some 3,840 kWh (at a halfpenny). My company aims at keeping radiation losses down to 2 or 3 kWh a day on conversion jobs.

An unlagged 20-gal. tank maintained at 160 deg. F will radiate 400 W continuously. With three inches of best-quality cork wool this can be reduced to approximately 50 W. Conversions should not be undertaken unless a clearance of at least three inches is available all round the tank. In practice it will be found that the cost of moving the tank to a central position in the linen cupboard to enable it to be efficiently lagged is quite low.

I do not agree with Mr. Smith that only 60 per cent. of water can be obtained without cooling. By fixing a suitable baffle to the cold-water inlet no trouble will be experienced with the mixing effect complained of. Practical tests show that a converted 25-gal. tank maintained at 150 deg. F. will give two consecutive baths. Builders of modern houses have been quick to realise that by placing the bathroom above the kitchen much unnecessary expense and pipework is avoided, and this is all in favour of the conversion job.

Points to Study

Before any form of electric water heating is installed there are several points which have to be considered. I place them in the following order: (1) Initial cost or hire charge; (2) size of bathroom or kitchen; (3) winter method of heating; and (4) maintenance.

Dealing with (1) I think it is admitted that the immersion-heater conversion has easily the lowest capital cost.

Regarding the size of bathroom or kitchen, in modern six-roomed houses the finding of a position for a self-contained unit is a great problem; in 90 per cent. of the houses in the suburbs of London there is room for only the 1½-gal. size. I found in one case, where wall fixing of a 15-gal. water heater was apparently the only suitable way, that the architect refused to allow such a weight to be fixed on the wall.

The Consumer's Point of View

When dealing with consumers of limited means it is necessary for the sales engineer to imagine himself in the consumer's position, and to temper his electrical enthusiasm with the common-sense budgeting of the average householder. This is another reason why, in the majority of cases, I pin my faith to an immersion-heater conversion. I believe that one coal fire per house does no harm to the electrical industry; if this fire is in the " living room " it probably heats water during the winter months independently or in conjunction with the immersion heater. The consumer usually expects to obtain a certain amount of hot water for his expenditure on coal during the winter months. In the summer time, however, he is only too pleased to dispense with the coal fire and let the immersion heater take over the water heating.

As to maintenance, I agree with Mr. Smith that for equal usage there can be little difference between a storage-water heater and an immersion-heater installation, in so far as this relates to the first three years following installation. After this time has expired maintenance costs in the event of breakdown of self-contained storage systems are heavy. The manufacturer's guarantee being for a comparatively short period, the consumer or supply authority may have to meet a heavy bill for replacement of parts.

A 2-kW heater with an immersed length of 9 in. only will fit almost any 20- or 25-gal. tank found in the South of England, and if this were standardised the highest maintenance expense would be the replacement of a standard element from stock. In the case of storage heaters, I imagine the supply authority would have to hold a large stock of replacement parts to keep pace with altered designs and the large number of heater sizes.

When Immersers Should Not be Used

Immersion heaters should *not*, I consider, be installed:—

(a) Where the " indirect system " of radiator heating is employed. In this case the hot-water tank is usually cylindrical and is fitted with an inner container from which the radiators are fed. The cost of installing an immersion heater here is heavy, and if the valve controlling the radiator circulation should be left open the radiation losses are very high.

(b) Where the hot-water tank is very much larger than required for any apparent purpose, *e.g.*, a 40-gal. tank in a small house with only two in family.

(c) Where several bedrooms with lavatory basins are fed from the same hot-water storage tank. In this case the long " dog-leg " feeds would also give rise to heavy radiation losses.

(d) In any other circumstances where the hot-water storage tank has been placed in a position remote from the draw-off points.

In all the above cases it is quite obvious that one has to try to find a suitable position for a self-contained unit.

Street Lighting at Sheffield

IMPORTANT developments in the Sheffield Lighting Department are surveyed in the report for the past year of Mr. J. F. Colquhoun, lighting engineer. As from August 1st, 1934, the full responsibility for the maintenance of all lamps was taken over by the Lighting Department, and during the eight months to the end of the financial year 22,468 lamps were purchased and tested; of this large number only 270 (1 per cent.) were returned to the makers as defective. In addition, constant tests were made during the " life " of the lamps, 507 readings being taken. Another development was the substitution of 100-W lamps for 5,198 of the 60-W type formerly used to light various residential areas. Furthermore, the complete overhaul of high-wattage electric lamps on tram routes and busy streets was inaugurated, and when this work is completed all fittings enclosing lamps of from 300 W to 1,000 W will have some device for controlling the light distribution. Of the 792 new lighting units erected during the year 693 were electric. The Department also became responsible for a further 117 electric lamps in the Norton area, so that the total at the end of March last was 6,324, compared with 5,516 a year before. With regard to maintenance, 17,059 lamps up to 150 W were used, representing an average of 1,057 burning hours, as compared with a guaranteed 1,000 hours on lamps purchased under B.S. Specification.

Sound Isolation. By E. C. Wadlow, Ph.D., B.Sc.

The design of supports for small motors

IN designing a sound isolating base for an electric motor the points to be considered are the noise spectrum of the motor; the likely modes of vibration of the foundation; the ratio of N/N_c to be aimed at, where N is the impressed frequency and N_c the resonant frequency, *i.e.*, the frequency at which the system vibrates if displaced from equilibriun and then released; the estimation of N_c for the various modes of vibration which can occur in the proposed suspension; the effect of transient vibrations at starting and stopping; and the selection of materials and sizes and the production of a practical design to conform to the requirements of the foregoing.

Motor Vibrations

Motor vibrations fall into two groups. The first is due to mechanical causes, such as out-of-balance of rotating parts, and therefore occurs at a frequency equal to the revolutions per second of the rotor or armature, *i.e.*, at 24 cycles per second for a motor running at 1,440 r.p.m. Frequencies below about 25 cycles per second do not affect the sense of hearing, but affect the sense of touch. If the frequency is over about 30 cycles per second it may be audible as a very low pitched hum. Owing to the very low values of N_c necessary in an elastic suspension to reduce this class of vibration, every effort should be made to eliminate it at the source by securing as perfect a dynamic balance as possible.

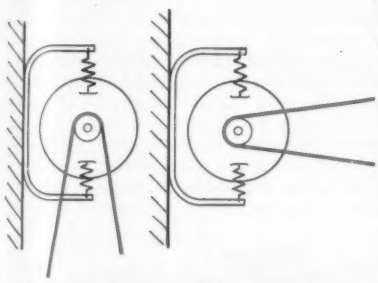


Fig. 1.—Of these two directions of belt pull that on the left is to be preferred

The second class of vibrations is electromagnetic in origin; these occur mainly at twice the supply frequency. Torque pulsations, which occur to some extent in all a.c. motors, are included in this group. Commutator motors, with commutator ripple and brush noises, have sources of vibration additional to those found in induction and synchronous types.

Although the motor has six degrees of freedom, and it is theoretically necessary to provide adequately high values of N/N_c for each of these in any effective elastic support, the characteristics of the main foundation usually simplify the practical problem considerably. A floor, wall, or ceiling is set in vibration in a direction normal to its surface much more easily than in any other, and has the most effective sound-radiating surface when excited in this manner. In practice, it is often sufficient if the elastic support is capable of dealing with all vibrations which may excite the foundation normal to its surface.

The value of N/N_c should be as high as possible, while retaining sufficient stability for the motor. Generally, a compromise has to be made, particularly when the side pull introduces difficulties. Suspension systems rarely need to be equally stiff in all directions and the belt pull should, if possible, be taken in a direction where the stiffness can be increased without prejudice to the transmissibility in a direction perpendicular to the floor or wall. An example is shown in fig. 1. For mechanical out-of-balance vibrations it is difficult to obtain sufficient rigidity for the base while providing a ratio of N/N_c equal to 2, except in motors running at approximately 3,000 r.p.m. and upwards, but a ratio of $N/N_c=4$ can usually be obtained to meet electromagnetic vibrations caused by 50-cycle a.c. supplies.

Self-contained machines, such as small a.c.-d.c. and d.c.-a.c. convertors, are the easiest to deal with as there is no external drive to be considered. Consequently, the natural frequency of the suspension may be made very low if steps are taken to prevent excessive rocking at starting and stopping. Next in convenience come examples where two small machines coupled together by a solid coupling, a belt or gearing, are mounted on a single bed-plate which itself can be flexibly supported on the main foundation (fig. 2). Any such bed-plate should be designed to have the minimum surface area so as to reduce the sound radiation from it. Motors and compressors for domestic refrigerators fall into this class, N_c of vertical vibrations being commonly as low as four cycles per second.

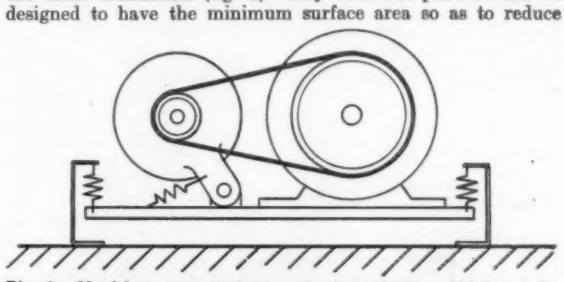


Fig. 2.—Machines mounted on a single bed-plate which can be flexibly supported on the main foundation

Chain and gear drives present most difficulties, but in certain circumstances elastic supports can be arranged. Here translatory movements of the motor are not allowable. Vibrations due to variable torque reaction can, however, be reduced by allowing the frame to oscillate about the shaft axis. Methods of achieving this with rubber and with flat steel springs are shown in fig. 3. These suspensions are very stiff to vertical forces, but allow the frame to oscillate fairly easily about the shaft axis. The remaining system shown in fig. 3, on the other hand, permits of similar free rotary oscillation of the frame, but is also very readily deflected by vertical forces. A design used successfully on an automatic gramophone record changing mechanism is indicated in fig. 4.

A Simple Formula

In regard to the estimation of N_c for the various modes of vibration which can occur in the proposed suspension, the most important case is usually that where the motor is resting on, or hanging from, a horizontal plane surface. If W_m is the weight of the motor in lb., W_s the weight of the elastic material (springs, &c.) in lb., N_c the natural frequency of vibration in cycles per second, and p the stiffness of the support in lb. per inch deflection, then

$$N_c = 3.128 \sqrt{\frac{p}{W_m + \frac{1}{3}W_s}}$$

This formula is a particular case of the general one, namely,

$$N_c = \sqrt{\frac{\text{Stiffness.}}{\text{Sprung Mass.}}}$$

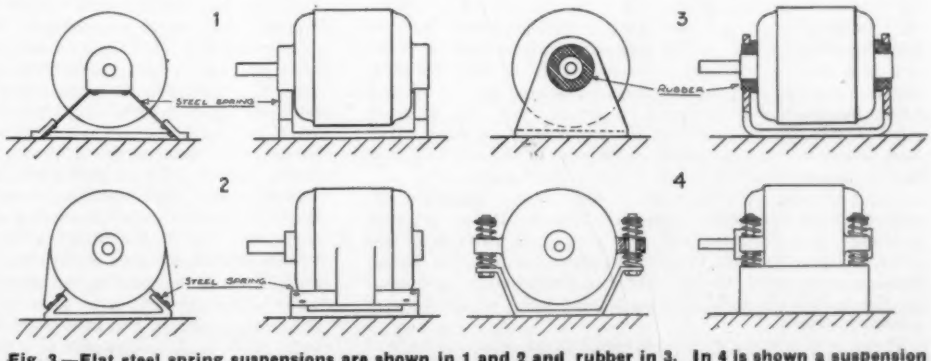


Fig. 3.—Flat steel spring suspensions are shown in 1 and 2 and rubber in 3. In 4 is shown a suspension readily deflected by vertical forces

It is usually sufficiently accurate to omit the term $\frac{1}{3}W_s$, at any rate from preliminary calculations.

When torsional vibrations are being considered, the stiffness must be measured in inch-lb. per radian twist, and the mass, W_m/g (g being the acceleration due to gravity, *inches* per second, per second), is replaced by the moment of inertia, $W_m/g\ k^2$, k being the radius of gyration (in inches), about the axis of oscillation. This is not necessarily the axis of rotation of the rotor or armature.

When the suspension is unsymmetrical the axis around which the motor oscillates is not readily calculated. Symmetrical arrangements make the calculation of the natural

frequencies easier, and have practical working advantages.

If the support has been designed with any of its resonant frequencies below the frequency of dynamic out-of-balance when running, a period will occur during starting and stopping when the impressed and natural frequencies will coincide. With slow acceleration there is a tendency for the power to go towards increasing the vibration rather than towards accelerating the motor.

Rapid acceleration and deceleration and a high degree of dynamic balance should, therefore, be aimed at, and if this cannot be achieved dampers and stops, which come into operation only at certain large amplitudes of vibration, may be necessary. In a recent discussion of the subject, Johnson[1] deduces the advisability of keeping the natural frequencies as low as possible to reduce the magnitude of resonance effects at stopping and starting, and of spreading them somewhat to avoid a peak vibration at or about one frequency. This divergence of the natural frequencies, however, will be almost unavoidable, it being usually a greater problem to get them sufficiently near together to obtain proper stability in some directions and enough freedom in others.

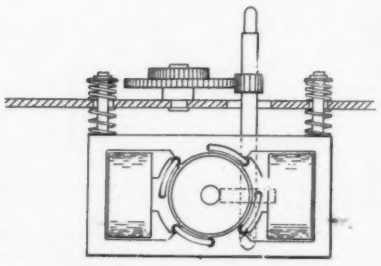


Fig. 4.—Design of suspension for gramophone record-changing mechanism

Types of Support

Although rubber is advocated and used by many manufacturers, steel springs have many advantages. With them the sound isolation can be made effective, and it will remain so throughout the life of the motor. From the point of view of design calculations they are advantageous because the stiffness is independent of the loading, and the strength can readily be determined accurately from tables or well-known formulæ. The only objection to the use of steel springs is the difficulty sometimes encountered of incorporating them neatly into the design.

This objection is less applicable to rubber which is very adaptable. A large number of rubber compounds are available, ranging from pure rubber to heavily vulcanised compounds such as ebonite. These materials have very varying moduli of elasticity and damping co-efficients. Unfortunately, those which have the most suitable elastic properties generally age most rapidly. Sorbo, for instance, can be used with excellent results when new, but under load it takes a permanent set which may be more than 50 per cent. of the initial thickness, with corresponding marked changes in stiffness and transmissibility in a particular application.

With rubber, the stiffness depends on the area of the pad as well as on the loading. It may be very high if the edges of the pad are confined. Use is made of this feature in the design suggested in fig. 3 (a). Here the edges of the rubber are confined and the shaft can be moved sideways or up and down only with difficulty, but the rubber, still being weak in shear, allows the frame to oscillate readily about the shaft axis. Torque pulsations can, therefore, be prevented from reaching the foundation at their initial magnitude.

The damping characteristics of rubber can also be varied. Where a motor is to be started and stopped frequently, out-of-balance and other vibrations may have to pass through some of the natural frequencies of the suspension and the additional damping which can be obtained with rubber as compared with steel may be useful in preventing excessive deflection at the resonant frequency. Similar effects can be obtained with steel springs by using additional damping devices.

Cork and felt show an increase in stiffness on compression, and consequently no figure corresponding to Young's modulus for steel can be given. In his experiments Hull[2] found the permanent change in shape under load to be greater for ground cork than for natural cork. In comparison with soft rubber cork of the same dimensions gives a much higher stiffness and resonant frequency. When the latter is adjusted to the desired value by reducing the sectional area of the cork, the latter may become weak mechanically and generally unsuitable.

Felt shows a very considerable change of shape if left loaded, and has a fairly high damping co-efficient. It is not of great value as the main constituent of an elastic suspension, but it may be very usefully employed for stop pads and the like.

While the general requirements for noise reduction are therefore easily stated, the very variable properties of rubber and other non-metals renders the design of a suspension employing them rather an empirical matter unless precise information is available relating to the exact quality of material it is proposed to use, or unless experience has been gained with similar designs. This is not so much the case when metal springs are used.

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Relay Time Tests

THE development of the modern time-interval meter incorporating a synchronous motor enables routine tests of relay time lags to be carried out easily. This type of meter is a most versatile instrument for such tests, as both the starting and the stopping of the timing indicator can be effected either by making or breaking circuit. Field time tests on relays can be arranged so that the measured time lag is either that proper to the relay alone or the sum of the separate time lags of the relay and the associated circuit-breaker.

When the inherent time lag of the relay is measured the testing circuit is usually arranged so that the timing indicator is stopped by the closing of the trip-circuit contacts of the relay. When the total time lag of the relay and the circuit-breaker is measured, the indicator can conveniently be stopped by the switching on of the green pilot lamp by the breaker auxiliary switch.

There is something to be said for each of these methods of testing. The total time lag of relay and breaker is the vital quantity in assessing the performance of the relay as a protective device, and it is perhaps best normally to measure this. When doing so, it must be remembered, particularly with relays of the instantaneous type, that a measured time lag greater than that expected may be due to faulty trip gear of the circuit breaker. If too high a value is found, the test connections should be altered so as to obtain the true time lag of the relay.

When planning for a routine field test of relay time lags, regard should be paid to the inherent time current characteristics of the relays tested. In regard to these characteristics, relays fall into two classes: the instantaneous, in which can be included the definite-time-lag and the inverse-time-lag types. Instantaneous relays, either with or without an auxiliary timing device, which superadds a definite time interval to that inherent in the relay itself, really have an inverse-time characteristic, due to the inertia of the moving parts of the relay.

Routine timing tests should, therefore, be so planned that the time lag is measured for currents slightly in excess of the minimum operating current as well as for those considerably in excess of this value. A timing test with a value of the current three or four times the minimum operating value is also advisable, particularly with relays of the solenoid type. With this class of relay chattering may occur with heavy currents, and the timing becomes somewhat indefinite.

With relays having an inverse time-current characteristic, the routine test of the time lag can either be made at one stipulated value of the current, or at three or more corresponding pairs of values of current and time enabling the actual characteristic to be plotted. It is not easy to make an accurate field test of the time-current characteristic of an inverse-time relay because the time lag changes very rapidly for small variations of the testing current in the neighbourhood of the steep part of the characteristic.

Theoretically, its time-current characteristic is determined by the pick-up current and the minimum time lag, and the slope of the characteristic at any value of the current depends upon the design of the relay. If, therefore, relays of this class are tested for timing at a single value of the current, this value should be fixed at a fairly high figure, so that appreciable errors in observation do not affect the time lag greatly. The underlying point is that field tests of time lags are inherently more accurate than corresponding measurements of testing current.—G. W. S.

Surge Suppressors. By F. Johnstone Taylor

Preventing water hammer with electrically driven centrifugal pumps

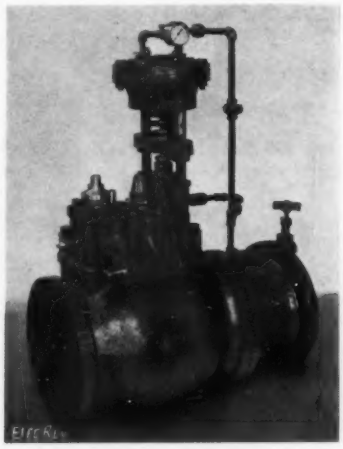
SHOULD the power supply to a centrifugal-pump motor fail, back flow of the water must be prevented by an automatic valve. With small sets this function can usually be performed by a non-return valve of the flat class, but with large units, especially those delivering through an appreciable length of pipe, as in waterworks pumping, this simple appliance fails to cope with the hydraulic conditions present. It may stick open due to failure of the mechanism or to wear on the hinge pins or the doors, so that when pumping ceases the water in the rising main flows back till the door suddenly slams on its seat causing severe water hammer; with high velocities of flow, the orthodox type of flap valve causes appreciable loss of head.

The conditions can only be met by a valve which will close slowly and which will absorb the minimum of head when in the open or working position. The special form of valve, sometimes referred to as a surge suppressor, is an adaptation of the streamline plunger or needle valve. That shown in the photograph originated with the Pelton Wheel Co., and is employed extensively on pumping plants in America while that shown in cross section depicts Messrs. Blakeborough's Larner-Johnson stop and check valve.

The Croton pumping station of the New York Water Supply contains three 3,000-h.p. 600-r.p.m. units which deliver through 1,600 ft. of 72-in. steel main. They are equipped with check valves and surge suppressors of the types illustrated. The latter function as relief valves in conjunction with the former. Both spring-loaded and air-loaded relief valves have been used under similar conditions but have not proved wholly satisfactory.

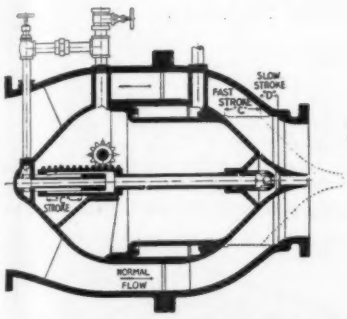
The pressure-time curve reproduced is typical for a pump delivery pipe following power interruption and using a check valve time-closure sufficiently rapid to prevent reversal of the pump. The pressure first drops by an amount sufficient to bring the discharge-water column to rest. The flow then reverses and the water, being suddenly retarded at the check valve, produces an excess pressure representing the velocity destroyed. The pressure then oscillates about an average value which is reached as the surges slowly die out. Where the static head is low and the pipe line is practically flat, the water column separates at the pump and moves up the pipe line until its momentum has been absorbed, after which it returns to the check valve and, without relief, produces a pressure rise developed during the return trip.

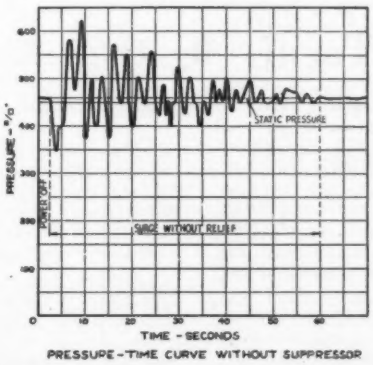
The essential point in either case is that the pressure at first falls appreciably below normal to retard the water column and then rises above normal as a return surge. The pressure relief device should function immediately after power interruption and the passage should be wide open to receive the return flow and by-pass it harmlessly around the pump into the suction. It should then slowly and automatically close, bringing the reverse flow to rest gently in the same manner as the excess-pressure valve or relief nozzle of a hydraulic turbine.



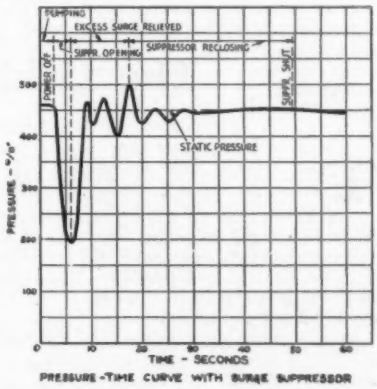
A large surge suppressor

In the pressure-time curve associated with this class of valve the excess surges have been damped out and the water column has been brought to rest in some sixty seconds. The time of check valve closures required to prevent reversal of electrically driven pumps is between five and ten seconds in most cases, while the time of final shut off to prevent pressure rise depends upon the length of the pipe line and is usually between thirty and one hundred seconds. The best form of control is a slow moving check valve (which should be closed before reverse rotation can take place) and a surge suppressor which will relieve the disturbance in the rising main and bring the water column to rest gradually and positively with the minimum waste of water.



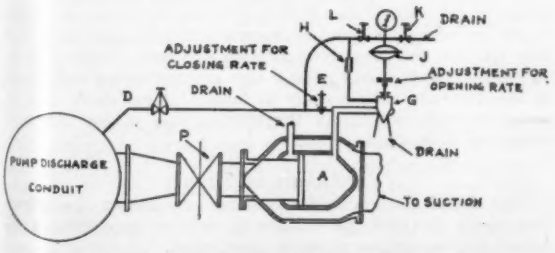


PRESSURE-TIME CURVE WITHOUT SUPPRESSOR



PRESSURE-TIME CURVE WITH SURGE SUPPRESSOR

Left: Streamline check valve. Centre: Pressure-time curve without suppressor. Right: Pressure-time curve with surge suppressor in circuit



General arrangement of surge suppressor

Operation of the Automatic Valve

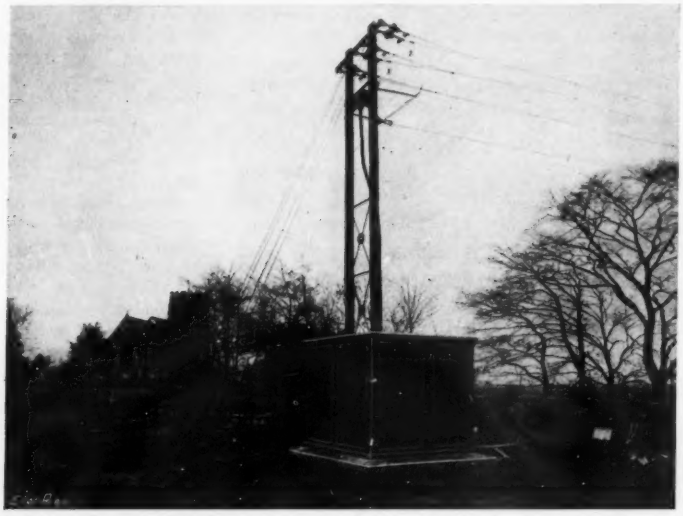
The streamlined class of automatic valve may be used as a stop valve and closes automatically with reverse flow: It is designed to close fairly rapidly at first and then to slow down and finally close at a much slower rate: the rate of closure is adjustable, but the change point from rapid to slow motion is fixed by the designer. Under favourable conditions the valve may be designed to close 75 per cent. to 90 per cent. before it begins to affect the flow in the pipe line, and by so arranging the controls, either electrical or hydraulic, the plunger movement can be started before any actual reversal of flow takes place.

The surge suppressor is normally held in the closed position by pressure water behind it coming *via* D and E from the delivery main. G is the diaphragm controlled blow-off valve, which is also held closed by pressure water passing through H, the valves L and K being test valves.

If the power fails in the motor the pressure drop releases the diaphragm valve and causes the valve G to open. Releasing the pressure in the valve chamber A allows the valve to open under the discharge pipe pressure, the rate of opening being adjustable. When the pressure builds up to a point higher than the tripping point—the latter is controlled by the setting of the resisting spring on the diaphragm—the diaphragm valve re-closes, the blow-off valve re-sets, pressure builds up in the central chamber A and the plunger valve closes at a rate controlled by valve E.

The Harrogate–Ripon Merger

THE Ripon Electricity Special Order was made in 1928 for supply in an area of about 100 square miles to include the city and rural districts of Ripon and part of the rural district of Wath. Supply was begun the following year by underground mains within the urban area and by 11-kV overhead lines outside as far as the southern boundary, where a bulk supply was taken from the Harrogate h.v. system. The capital expenditure on the undertaking amounts to about £70,000. Consumers in the city number 1,181 and in the rural area (14 villages), 419; these take a million kWh per annum with a m.v. of 500 kVA. The undertaking has been financially successful since its inception.



A rural control and transformer kiosk

On July 3rd the undertaking was formally transferred to Harrogate Corporation under its Extension Special Order, 1935, and the new electricity offices and showrooms at Ripon were opened by Sir John Brooke (vice-chairman, Electricity Commission). Harrogate Corporation is also the authorised supplier in Knaresborough Urban and Rural Districts, Pately Bridge R.D., and part of Great Ouseburn R.D., in addition to other areas in which non-statutory supplies were formerly given. In these outlying areas 660,000 kWh was supplied to 1,892 consumers last year, and nearly one-quarter of the 452 farms are connected.

Harrogate power station has operated as a "selected" station since the beginning of 1933, and the distribution system was standardised in 1929. The capital expenditure on the Harrogate undertaking has increased by 171 per cent., to £748,000 since 1927, the kWh sold by 220 per cent. to 17 million and the number of consumers by 162 per cent. to 13,000. During the same period the average rate has been reduced by 29 per cent. to 1.7d. per kWh. With scarcely an exception all the motive power in Harrogate is derived from the undertaking's mains. One cooker is installed to every nine consumers and one water heater to every twelve consumers; an average of 1,065 kWh is sold per consumer.

The Grid Tariff. By G. Wilkinson, M.I.E.E.

Developing the off-peak heating load

THE national grid represents a capital outlay to date of about £50,000,000. Its annual sales are at the rate of over 18,000 million kWh, on an average load factor of about thirty-five per cent.; this is based upon the last monthly returns issued by the Electricity Commissioners, which show that for the five months ended May, 1934, 7,355 million kWh has been generated—an advance of 11.7 per cent. on the corresponding period of 1934.

Bulk supplies are given to local undertakings by the Central Electricity Board on a two-part tariff averaging approximately £3 per annum per kW demanded plus 0.2d. per kWh.

On these data the annual returns for the whole industry work out at 6,000,000 kW at £3=£18,000,000, plus 18,000 million kWh at 0.2d.=£15,000,000, giving a total revenue of £33,000,000. This two-part tariff is too low as to the fixed charge and too high as to the running charge; presumably the latter makes good fixed charges not met by the £3 item.

In his article on "Power Supply Prospects" in the ELECTRICAL REVIEW of June 7th, Mr. W. B. Woodhouse states that "the cost of off-peak energy in a large power station is very small and, with suitable means for controlling the use of electricity and with provision for heat storage, a price as low as 0.15d. is possible, a figure at which heating by electricity is a practical commercial alternative to many local plants." With this statement I entirely agree.

Utilising Surplus Energy

The low average load factor of the national supply of thirty-five per cent. cannot be improved to any great extent with the single bulk-supply tariff in vogue, but it is obvious that the Central Electricity Board has a surplus approaching 35,000 million kWh a year available for sale which can be profitably disposed of if a market be found at Mr. Woodhouse's figure. No additional cost in the shape of a fixed rate is chargeable on this figure, as its production and transmission to the local supply authorities entail no material cost to the Board beyond the cost of the extra fuel consumed in its generation. It follows therefore that this huge "out-of-bounds" amount of energy can be sold very profitably in bulk at a flat rate of 0.15d. per kWh. All that remains to secure this immense increase of business is for the Central Electricity Board to initiate an additional tariff as stated, with the proviso that all energy so supplied shall be separately measured and used exclusively for heat-storage equipments in such a manner that the maximum demand on the grid cannot be augmented.

Under the additional tariff named the annual revenue will be increased from £33 million to approximately £54 million by the sale of 33,428 million kWh at 0.15d. per kWh. This improvement in earning capacity by sixty-three per cent. can be obtained merely for the extra cost of fuel to generate the additional units which, together with the small items of extra oil and repairs, will not exceed 0.1d. per kWh or £13,928,333, leaving a profit on the low-priced flat-rate heating units of nearly 50 per cent. These figures relate to the full development of the business which will be approached more closely as time goes on, but the improvement from the early stages will be substantial, and would permit also of progressive reductions in the two-part tariff already in force. Thus every class of consumer will benefit by the introduction of the proposed additional bulk-supply tariff.

A Harrogate sub-station showroom

Conditions of Supply

That electrical supplies for heating purposes on the attractive terms proposed are subject to definite limitations as to extent and conditions must be emphasised.

In the first place, the call for the heating supply must be maintained rigidly within the limits of the plant required to meet the demands for lighting, power and other industrial or domestic purposes under the existing two-part bulk-supply

tariff. This tariff is fixed on a scale which meets all the capital, fixed and running costs of the national undertaking, but the kWh charge is too high to foster employment of the plant beyond about one-third of its daily capacity.

Secondly, the low-priced flat-rate heating supplies must be so arranged as to be incapable of increasing under any circumstances the maximum demand already imposed by the two-part tariff consumers.

Both these fundamental conditions can readily be met on practical lines by the local supply authorities, provided they can purchase the bulk supply for heating purposes at 0.15d. per kWh. The additional equipment necessary to utilise the heating current, plus a reasonable profit to the undertakers, will enable them to sell at 0.25d. per kWh to small consumers and at, say, 0.2d. per kWh to large consumers who are favourably situated to receive the supply.

Electrical Terminology. By H. R. Taunton, A.M.I.E.E.

The case for the adoption of shorter words

THE omnibus was introduced into London in 1829, but it was not until last year that the L.P.T.B. officially recognised the shorter "bus" by which it had been known to four generations. Photographs and telephones are other ancient inventions, but it is still thought hardly the thing to write of them as "photos" and "phones," while "wire" for a telegram is, of course, sheer slang!

We are developing, like the ancient Egyptians, two languages, and the esoteric jargon of official scribes becomes further and further removed from the speech of every day. Even the electrical industry is contributing its quota of polysyllabic pomposity. One would have thought that men so essentially modern and practical as electrical engineers would have been above this pedantic partiality for the longer word, this snobbish refusal to accept the terse and sensible equivalents used by common people, at least among themselves, when they descend from their oracular dignity to the workaday plane. But no; any technical book or journal, any consultant's specification or business man's correspondence file will show how far already is the written language of electricity from that which we use in ordinary speech.

Take, as a simple example, the word "ampère." Did you ever hear professional or business men use any other than the popular "amp." in speaking of current? But did you ever know him write in article or letter anything but "ampère"? Why not "amp," which is a perfectly good word, short, simple and unambiguous? Why, because of some formal occasion, tack on the needless "ère"? (That is the third time I've had to halt to put in the irritating accent, as there is none on my keyboard!) There is only one reason; he thinks the longer and more stilted form is necessary to dignity, ignoring the fact that some of the best and most powerful English has been written in words of mostly one syllable.

The I.E.E. Regulations

There are many examples of this sesquipedalian terminology in the new I.E.E. Regulations, which is a pity. They are intended largely for the guidance of practical men, of contractors and wiremen, and it would have been but reasonable to have called things by the simple names they themselves use in the course of their work, even at some small sacrifice of dignity and formality. There need have been no sacrifice of legal definition. While they were about it, it would have been as easy for the compilers to define, for instance, "flex," as to define, as they have, "flexible cord." "Flex," indeed, is a happy example of the superiority of the popular name over the official. "Flexible," strictly speaking, is an adjective, not a noun; and the longer "flexible cord" of the Regulations is ambiguous, as it might mean mere rope. The common sense of those who have to use it daily has coined the monosyllable "flex," which is a pure noun, with a clear and definite meaning. Why not adopt it officially? It has already percolated to the layman; and the writer of "thrillers," with whom it is a favourite for his sinister purposes, has given us technicians a lead, though, perhaps, that is not an argument to appeal to our purists.

"Distribution fuse-board" is another case where the Regulations prefer to use three times as many syllables as are necessary. No one, from consulting engineer to wireman's mate, ever speaks of "an assemblage of cut-outs, &c.," as anything but a "disboard." Why, then, in a manual intended for their use, use an unfamiliar and more clumsy term?

"Earth *continuity* conductor," "*lighting* fitting," "fuse-*link*," are other, though less important, examples of terms needlessly longer than those in common use; as also are "internal" and "external" (conductors) for the more usual "inner" and "outer."

With regard to "fuse-link," or "fuse" as we common people call it, the I.E.E. definitions quite rightly stress the distinction between it and a cut-out. A cut-out, comprising "all the parts which, together with their mounting, base, and containing case or cover (if any), form the complete device," is too commonly spoken of as a "fuse," a term which should be kept for the fusible metal contained in it.

In their definition of "Socket-outlet and plug" the Regulations correct another common but erroneous term. It is certain that the trade will never be persuaded to speak of "socket-*outlets*," but it will be something if they learn to use the shorter "socket" for that portion of the device which contains *sockets*, and "plug" only for that portion which *plugs* into the other. As it is, manufacturers, suppliers and contractors alike, almost invariably call the former a "plug" (wall-plug, floor-plug and switch-plug), and, absurdly enough, also call the latter a "plug," or, at best, a "plug-top."

Incidentally, the new term "lampholder plug" is unlikely to displace the well-established "adaptor"—not "lampholder adaptor," as the Regulations have it. Doubtless they are right in trying to distinguish between this and what they call a "socket-outlet adaptor," but which the trade calls, and will probably continue to call, also an "adaptor," or "plug-adaptor."

While on the subject of definitions, it is curious that, while one is given of "live" metal, there is none of "dead," such as that in the Home Office Regulations. There are other omissions, such as "conduit"—as necessary as cable to the electrical equipment of most buildings—but they are unimportant; and we may assume that, since it was obviously impossible to define everything a wiring contractor uses, or may use, in his work, their non-inclusion is due to a pre-determined scheme.

One Syllable, Not Three

To return to the main question, if there is already commonly current a short, apt and non-ambiguous term for something electrical, why not adopt it in our writings as we do in our speech? In other words, why use three syllables when one will serve as well, or better? It is true that in the electrical field we have the initial handicap of a modern and swiftly growing theory and practice, requiring a novel and ever-widening vocabulary, and that this must almost unavoidably be derived from Greek and Latin sources, with a few happy exceptions such as volt and ohm. That makes for a long-winded and clumsy nomenclature; but it has the advantage that, being in the nature of a lingua franca, it is almost as international as scientific thought itself. We cannot tamper with it therefore, nor is there need to.

The case is different, however, with the practical applications of electricity. There is nothing international, for instance, in the wiring of buildings. Much of its terminology is not derived from classical sources, but from Anglo-Saxon, or, at least, English. We can make it what we will, without prejudice to the cause of a universal language, and the shorter and simpler the better.

The tendency of any living language is to shorten and simplify its later accretions and to substitute words of one or two syllables for its earlier clumsy attempts at naming new things. The dictionary is full of such words, many of them originally "vulgar" slang, which, terse, apt and powerful, have forced their way into it and are now respectable English.

It is too often a slow process, a long fight between the common sense (laziness, if you like) of those who have to use the things named, against the pedantry of those who merely write about them. Let us hope, however, that we shall not have to wait till the Twentieth Edition of the I.E.E. Regulations before its compilers give official recognition to some of the terms already familiar to the wireman. At least, let us have "flex" in the next edition!

Lights Visible in Daylight and Fog

In a recent issue of the *Proceedings* of the Japanese Imperial Academy, Mr. Daio Nukiyama gives a description of the method he has devised of rendering lighthouse illumination visible in daylight and fog. In general, the method consists of the use, as the source of light, of lamps emitting radiations which do not exist in the solar spectrum, conditions which are met by sodium and potassium vapour lamps.

The Municipal Transport Conference

Electricity for traction: Co-ordination of services

THE Municipal Tramways and Transport Association held its annual convention in the Isle of Man from June 25th to 29th. The president, Mr. J. F. Cameron, general manager of the Northampton Corporation transport undertaking, was in the chair throughout the proceedings, which included discussions and a civic reception and luncheon. On Saturday there was an all-day trip round the Island, the evening being devoted to a "Family Party Concert" in the Villa Marina at the invitation of the Mayor and Corporation of Douglas.

On June 26th the Association was given a welcome to the Island both by the Governor, Sir Montague Butler, and the Mayor, Alderman J. H. Skillicorn, after which the president gave his address.

The Road Traffic Act

In his address Mr. Cameron remarks upon the number of municipalities which state that they have not derived any benefit from the Road Traffic Act, 1930. He suggests that such statements arise from the fact that many municipalities are being restricted, even within their own boundaries, and asks whether company operators would answer in the same negative fashion if asked the same question.

Mr. Cameron believes that the process of monopolisation has been facilitated by the 1930 Act to the advantage of private interests without any commensurate advantage to the general community.

An eminent financial authority, in connection with the London Passenger Transport Arbitration Tribunal, appointed to decide the values of undertakings taken over by the London Passenger Transport Board (and this may very well be used in other cases) has declared that ten per cent. per annum is a reasonable rate of yield of money invested in such enterprises. This in itself is a fact of the greatest significance in relation to the present position, especially when one remembers that during recent months many millions sterling of municipal stock has been issued at three per cent., or slightly under that rate, and has been largely over subscribed. One need only compare such charges for interest by local authorities with the dividends of companies operating public service vehicles, which are commonly 10 per cent. plus a distribution of bonus shares at intervals, both of which are imposed on the public for a social service of primary importance. In other words, enough to pay not only interest on capital, but a large percentage of debt-repayment requirements, that correspond with the depreciation charges of a company, which cannot redeem its own share capital.

When a number of boroughs and populous urban areas are so close together as to amount to what is really one vast town, then mere self-preservation dictates that there *must* be some unity in a common service. Transport has ceased to recognise municipal geographical limits in such areas, and neighbouring boroughs should be made aware that if inter-running arrangements cannot be made on their own initiative, pressure will undoubtedly come from outside.

The municipal representatives' efforts to bring omnibus employés within the scope of the National Joint Industrial Council for the Tramway Industry have been persistently opposed by the company representatives.

In connection with road safety Mr. Cameron states that the production of a really efficient fog lamp is believed to be sufficiently important to warrant scientific investigation and the Ministry of Transport has been urged to take action.

Electricity Still Too Dear

With regard to the price of electricity for traction purposes, the Association has pursued the subject further during the year, and has satisfied itself that it is not possible to devise a formula, of general application, for determining the actual cost of production. In fact, while negotiations on this matter were proceeding with the Incorporated Municipal Electrical Association further reductions in charges were negotiated in various parts of the country. It is clear that a sound financial principle is being disregarded, namely, that one branch of local government service should not be placed under tribute to another branch through the medium of excessive charges, or at any rate at such charges as no large commercial undertaking is ever asked to pay or would even tolerate. Electricity for traction purposes is still too dear, says Mr. Cameron, and he warns those who guard the destinies of the electricity supply side of their activities to take due warning of the fate of those who charge too much for their electricity.

Municipal passenger transport consumes over 720 million kWh every year. The motor omnibus has now reached such a pitch of mechanical efficiency that electricity had better beware. If this country is to continue to prosper and thrive, abundant electricity will have to be available at a much lower general charge than is made to-day.

Co-ordination Discussed

During the discussion on a paper entitled "The Co-ordination of Road Passenger Transport and the Formation of Passenger Transport Boards," Councillor E. Tye (chairman, Burnley, Colne and Nelson Joint Committee) said that as the result of the operation of this Committee during the two years it had been in existence, from 1933 to 1935, the receipts had increased by £10,407; the number of passengers by 2,102,676; and the car miles by 372,241, while the working expenses had decreased by £714.

Mr. W. Vane Morland (general manager, Leeds) said he believed that unless some means was found of expediting decisions and securing smoother and more concentrated development, municipal road transport operation would gradually come to a stalemate throughout the country. The Executive Council of the Association should appoint a small sub-committee to go carefully into this matter during the next twelve months to see to what extent the various authorities could be linked up to give a common ownership.

The need for greater co-ordination was also urged by Mr. R. McCreary (general manager, Belfast), who referred to the Northern Ireland Road and Railway Transport Bill now before the Government of Northern Ireland, and suggested that a consideration of its clauses might give a lead to municipalities in this country. He emphasised that the Belfast Corporation was maintaining the control of the traffic in its own area while being a member of a proposed Board.

Mr. J. Atherton (general manager, Leigh, Lancs) expressed the view that although there might be one or two special cases in certain parts of the country where joint transport boards were justified, they should not be used as an argument that such boards should be established generally throughout the country. He claimed that ordinary inter-running arrangements could be entered into which would effect the same results as joint committees or boards, but would still leave the local authorities in control of their own undertakings. Bailie Alexander McLean (convener, Glasgow), said that although his authority was anxious to help in the unification of road passenger facilities in Scotland it wanted nothing to do with transport boards.

Essay Competition

The number of entries in the essay competition was 199 and the winners were:—

Section 1 (administrative and supervisory staffs), Mr. C. E. Grayson, deputy chief accountant, Leeds Corporation Transport Department; section 2 (operating staffs), Mr. J. R. H. Barnes, inspector, Manchester Corporation Transport Department; section 3 (supervisory staffs of technical departments), Mr. R. Houlgate, sub-depôt engineer-in-charge, Burnley, Colne and Nelson Joint Transport Department; section 4 (craftsmen and maintenance staffs), Mr. Edgar V. Dyson, electrician, Huddersfield Corporation Tramways & Motor Omnibus Department, for his essay on "Maintenance and Repair Work on the Electrical Equipment of Tramcars, Trolley-buses and Motor Omnibuses."

At the annual meeting of the Association the Council's report and the accounts were adopted without discussion. The elections to the Council for the coming year resulted as follows:—President, Alderman H. Clark (chairman, Rochdale Transport Department); vice-president, Mr. Owen Silvers (general manager, Wolverhampton); hon. treasurer, Mr. A. R. Fearnley (Sheffield); hon. solicitor, Mr. F. H. C. Wiltshire (Birmingham); Members of Council (to fill vacancies), Alderman A. H. Gledhill (Halifax), Alderman A. Rudd (St. Helens), Mr. W. Forbes (Cardiff), Mr. A. C. Baker (Birmingham), Mr. C. Hopkins (Sunderland) and Mr. R. Taylor (Dundee).

Conduction Through Transformer Oil

Investigations into the conductivity and power factor of transformer oil at high stresses have shown that the relation between the applied voltage and the conduction current under direct stresses between 50 and 300 V per mil can be expressed by formulæ, which are given in the I.E.E. *Journal* by Dr. J. F. Gillies. Pure transformer oil has a specific resistance greater than 4×10^{9} megohms per cm. cube at a stress of 50 V per mil, while its power factor is of the order of 0.00005 at stresses under 70 V per mil (r.m.s.), but increasing rapidly above this stress. The author suggests that the observed results can be explained by a theory of ionisation by collision at high stresses.

The Gas-Cushion Cable

A new development which should effect considerable saving

IN his speech at the annual general meeting of Messrs. W. T. Henley's Telegraph Works Co., Ltd., the chairman, Sir Montague Hughman, referred to the laying in Holland of an experimental length of cable to operate at 150 kV. This cable is the "gas-cushion" cable invented by Dr. P. Dunsheath, Henley's chief engineer, and is described in a paper at the Conference Internationale des Grands Reseaux Electrique à Haut Tension.

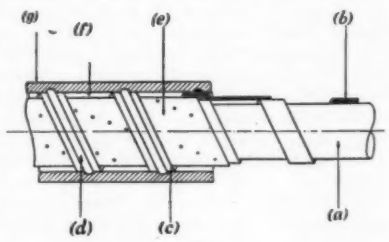


Fig. 1

The gas-cushion cable is an armoured cable which may be laid directly in the ground and requires no exceptional accessories. The dielectric consists of paper impregnated after application to the conductor. A sub-divided and screened space between the dielectric and the lead sheath provides, at all points along the length of the cable, accommodation for the storage of inert gas under pressure. The series of gas cushions thus formed prevents ionisation due to voids in the dielectric and also permits local expansion and contraction of the compound with fluctuating loads. As the gas cushions are separated from each other by barriers, accidental damage or cutting the cable for jointing causes loss of gas from a short length only, and the loss can easily be made up.

The gas cushions are formed by means of spiral spacers wound over the metallised paper-screened core, each spacer being made up of layers of metallised paper retained in position by a narrow metal strip coated with a low-melting point alloy before application to the cable so that it may subsequently adhere to the lead sheath and provide a barrier to escape of gas.

The construction is indicated in fig. 1, where (a) is the core insulated and impregnated in the usual way; (b) the inner half of the spiral spacer consisting of piled paper strips; (c) the outer half of the spiral spacer; (d) the metal strip binding down the spacer on to the core, and subsequently soldering itself to the lead sheath; (e) the seal control, which is a wide strip of perforated paper built up half-way through the gas-cushion space to facilitate the sealing of the individual turns of this space.

Difficulties to be Overcome

To procure the full effect from the gas cushion there must not only be no passage of gas longitudinally past the barriers (b) and (c), but also there must be no direct path round the spiral space. Reconciliation of the fulfilment of the last condition with the ability to charge the cable with gas is obtained as follows: When the spiral spacers, control seal and metal binding strip have been applied to the previously impregnated core the cable is lead-sheathed, and as it passes into the lead press the space between the control seal and the lead sheath becomes filled with sealing compound. This compound, owing to its viscosity and the smallness of the holes in the seal-control paper strip, remains almost entirely in the outer half of the gas-cushion space, so that, after lead-covering, the inner half still remains open for a gas charge from the end of the length.

The cable is reinforced, subsequent to lead covering, with non-magnetic tapes; gas at about 12 atm. is then admitted, after which the ends of the length are sealed. The sealing compound then gravitates through holes in the seal control, and as it moves from the complete outer half of the spiral into the lower part of both halves the gas travels to the upper part of the cable and the compound forms a complete seal in each turn of the spiral space. The individual gas cushions now consist of separate saddle-shaped spaces, each approximately half the circumference of the cable, sealed on both sides by a packing of paper held down by the alloy-control strip, which is itself sealed to the lead and at the two lower ends by the compound standing in the lower half.

Shaped strands are employed to form a voidless conductor, which prevents escape of pressure longitudinally and reduces the amount of compound to be accommodated in the gas-cushion space during expansion due to heating.

The construction of the joints is very similar to that adopted for normal cables, except that the shell is designed to withstand the working gas pressure.

In the design of the 66-kV joint, illustrated in fig. 2, a semi-barrier (2) at each end restricts the flow of the joint compound, but free passage of the gas is permitted *via* the pipe (3). The cable cores are reinforced in the normal way with the paper cone (5) and the stress cone (4). A standard cable connector (7) is sweated to the conductor, and the centre of the joint is insulated with the sleeve (8); high-voltage filling compound is used within the shell. A valve (6) in one of the filling-hole plugs enables the joint shell and the ends of the cable to be charged up with gas under pressure, which automatically compensates for any loss from the first few feet of cable during jointing. In a second design paper strips are lapped on to the core to replace the insulation removed for making the joints, and a metallised layer is applied over all. The shell is compound-filled, a measured air space being left at the top, and a valve is provided for gas charging.

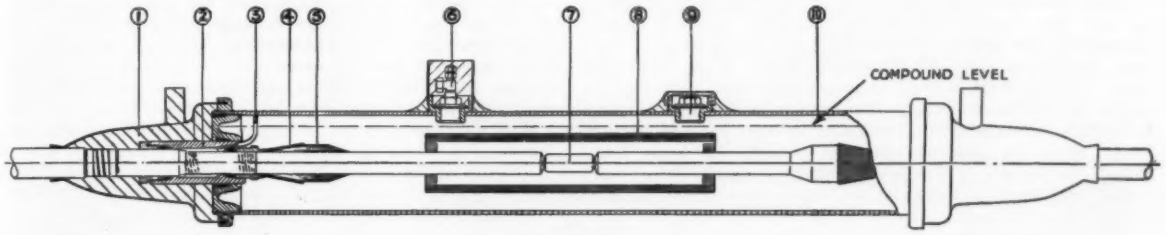


Fig. 2

Economies Effected

At a working pressure of 33 kV the chief advantage of the gas-cushion principle is in reduction of cable weight. The cost of the gas cushion offsets to some extent the saving due to reduction in dielectric, but at 66 kV and upwards there is a reduction in cost as well as considerable saving in section, which facilitates handling and may enable a cheaper route to be chosen by permitting the taking of sharper bends. At 66 kV a 0.35 sq. in. gas-cushion single-core cable with an overall diameter of 1.977 in. would be suitable for transmitting 450 A, whereas a 0.5 sq. in. solid-type cable with an overall diameter of 2.801 in. would be needed for the same duty. The gas-cushion cable may safely work at

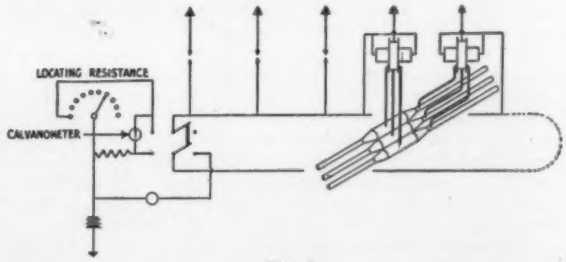


Fig. 3

75 deg. C., as against a maximum of 65 deg. of the solid type.

For very important installations the additional expense of a second lead sheath to avoid any possibility of leakage of gas and a system of leakage protection is justifiable. For this purpose the cable is screened with an outer space maintained at a small pressure above or below atmospheric and connected to apparatus which gives warning should the space become charged with gas or be punctured by corrosion or mechanical damage. Fig. 3 shows the principle of operation.

Engineers and Economics. By F. R. Jervis, B.Com.

Lines along which a study of the subject is beneficial

AT the present time it is the general practice of various professional bodies to include in their examinations for membership a paper on economics. This is seen particularly in the different accounting and secretarial institutes and societies, including the Institute of Bankers, the Institute of Transport, and the Industrial Transport Association, while the engineering societies equally are not backward in this respect. In most cases the syllabus and the type of question set have a particular bearing on the special needs of the industry concerned.

There is no doubt as to the usefulness of the study of economics. It is a science and has the same value in the development of mental faculties as has mathematics, physics and psychology, while it also leads to a knowledge of the basic principles of the science and its applications to present-day problems. In just the same way as it is possible to study mathematics as part of a general education course, and also to study it for its practical applications in commerce and engineering, so there is a two-fold use for economics.

Probably at no time has there been such a need as there is to-day for an adequate knowledge of economic principles. Not only is the technique of production changing rapidly, but ideas of control, particularly relating to governmental interference, are very different from what they were a few years ago. It is important that people in their capacities as administrators or voters should realise fully the economic consequences of the steps they are taking—or of the steps they are being forced to take. Such an attitude of inquiry is almost completely non-existent. Although the vocabulary of economics is on the lips of every statesman or leader writer the spirit of economics is absent.

The study of economics has dangers which are peculiar to it alone and which probably have no parallel in any other subject. The average person who has never given a single thought to the subject is naturally an "authority." An example of this is the ill-informed criticism of the two-part tariff by people ignorant of the electrical industry. Some people really believe that it is a device by the supply authorities to obtain a revenue at no cost to themselves. Later, when the student has read a little, he finds that there is something in the subject after all, and after several years' hard study he comes to the conclusion that he knows nothing at all about it. Then is his chance to learn.

There is a great deal of criticism of economics, or, rather, the criticism is applied more directly to economists as individuals. It is pointed out that where you have ten economists you have ten different economic policies. That is partly true, but it is not true only of economics. There is also a difference of opinion among engineers, or else why are there so many different types of tariffs in existence in different parts of the country? This difference of opinion, however, is greatly exaggerated. There is a vast body of economic knowledge about which there may be a slight difference of interpretation, but no fundamental difference of opinion; in fact, there are settled conclusions among real economists.

An I.E.E. Examination Paper

What of the value of economics, apart from its mental and political values, to the engineer? How will the study of economic science make a man a better engineer, or administrator of an engineering undertaking? Here it must be confessed that it is of no greater use than is proficiency at golf or a knowledge of Egyptian dynasties. Economics treats of causes and effects in a broad way, and has special bearing on the result to the community of different lines of action; it does not profess to explain ways of attaining certain desired ends in particular problems; the latter is a technical problem only. Economics does not teach, for example, how a particular undertaking may be run more efficiently, but it analyses the effects of its efficiency, the reduction in price, the increase in business and the development of the industry. It is this last aspect which is of interest to engineers as engineers and not as citizens, and it is for this purpose that the Institution of Electrical Engineers has included a paper on "Engineering Organisation, Management and Economics" as an alternative subject in Part II of the graduate examination.

The first criticism is that the word "economics" should be deleted from the heading. An engineer who is working during the day and studying during the evening has quite enough to do without spending valuable time in learning a purely extraneous subject. The paper will defeat its own purpose if it helps to turn good engineers into bad economists. The former are valuable citizens; the latter a pest.

Let us now consider the published syllabus in the light of what has been stated. The first two lines are too general and have no bearing on engineering organisation. "Growth of Industrialisation" and "Origin and Development of the Commercial System" are subjects of economic history and give rise to the same objection as has been made against the study of pure economics. "International Trade and Exchange" is a most difficult part of economic theory if it is studied properly. The time thus spent could be more profitably employed by an engineer on other parts of the syllabus. "Natural Resources and Commodities of the World Trade" is economic geography which is interesting in itself, but hardly treating of anything likely to come within the experience of an engineer in an undertaking supplying domestic and industrial consumers.

These particular items have been picked out from the latest regulations and I submit that to study them in the only suitable way, that is, thoroughly, will absorb a great deal of time, while to study them cursorily will be worse than useless, because it will probably result in erroneous ideas being acquired.

Too Wide a Scope

Practically each sub-heading is a subject in itself; in fact, there is as much work to be gone through as in all the other papers put together. It means that other sub-headings which are of primary importance from an administrative point of view will be neglected through lack of time.

The really important points in the syllabus are diluted with a great deal of unimportant matters. To take the subject of "Statistics and the Use of Graphs," there is a lack of knowledge regarding the basic principles of statistics. This subject has particular reference to the use of averages, a most important point when dealing with different types of consumers and their consumption. General principles of management, office organisation (how necessary!) and the human factor, the selection and training of staff, and staff welfare should be studied in detail.

The great development of engineering (and the consequent increased productivity of modern industry) has been due to a division of labour and to a specialisation of different functions. This tendency should not be reversed. Economists have the greatest of confidence in engineers as engineers, and there is no doubt that present-day British engineers are capable of solving all the highly complicated technical problems with which they are faced. But this confidence should be reciprocated. The problems of economy are different in kind from those of technique, and just as the engineer would not expect an economist to give gratuitous advice about the technicalities of his own particular problems, so the economist can see no useful result arising from engineers trying to teach him his business.

At the same time, apart from purely technical matters, the electrical engineer will add greatly to the efficiency of his industry by studying the organisation and management of electricity undertakings. In this field there is much to be done. Some useful comparisons could be undertaken between the organisation of an electricity department which depends upon the support of the consumers and the internal organisation of the large departmental stores where systems of management are noteworthy for their efficiency. In other words, attention should be diverted from general, social and semi-political studies to the particular problems of organisation and control in the industry.

Electric Cooking in France

Great progress was made last year in the matter of electrical cookers in Paris. According to the Paris Electric Company, over two thousand electric cookers were installed during the year. Some ninety-five apartment buildings were equipped with electric cookers only, and there were fifty-three restaurants and 455 other establishments, such as bakeries, pastry cooks, hotels, &c., similarly provided with electric cooking and baking. The Paris Electric Company has developed an efficient organisation for selling or renting electrical apparatus at the lowest possible cost. A problem which is sometimes encountered is the insufficient size of the wiring in the apartment buildings. In principle, these installations have nothing to do with the company, but in many cases where the owner has not wished to go to the expense of rewiring, and the tenants wanted cookers or heating equipment, the company has taken upon itself the onus of such work, charging the users a rental only.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

The Case of a Cooker Switch

I am one of those unfortunates who must use electricity for cooking and am therefore confronted by a bill many times the size of that which would result from the gas equivalent, even before allowing for the cost of replacing numerous elements.

Lately the spring which forms a component and easily removable part of one controlling switch in the cooker failed (after barely 4,000 reversals). I asked the makers for a replacement and offered to pay. They replied that they could not supply a spring but would quote me for a complete switch.

Is this not rather like saying that the loss of a dog collar must be followed by the purchase of a new dog? Has this particular form of commercial piracy extended to the electrical industry?

R. B. FAIRTHORNE.
Lt.-Com. R.N. (Ret.), A.M.I.E.E.

Higher Denham, Bucks, *June 28th.*

A Meter Problem

We give you hereunder an extract from a letter received from one of our customers, which we feel sure will interest you :—

"It is possible with the meters I had from you to obtain electric current without the insertion of coins by unscrewing the small box covers and fixing a piece of wire between the two points, so by obtaining light direct instead of the current passing through the meters. Tell me what to do so as to overcome this matter."

June 28th. Z.

Showroom Discounts

At the recent Bournemouth Conference it was a pleasure to hear the efforts put forward for standardisation of voltage, plugs, &c., but it would appear that standardisation is also necessary with regard to the giving of discounts for cash sales in municipal showrooms.

I recently sent out a questionnaire to several authorities asking "Do you give discount for cash sales in your showrooms?" It is rather surprising to find that 40 per cent. replied in the affirmative and 60 per cent. in the negative. Under Section 48 of the Electricity (Supply) Act, 1926, it is laid down clearly that the price of any goods sold to a consumer shall be the net price as listed.

As there was a diversity of opinion in reply to the questionnaire I communicated with the Electricity Commissioners and they expressed the opinion that they would prefer not to give a ruling. I was referred to the Electric Fittings Statutory Committee, and it is apparent from the reply received, which coincides to a large extent with the views expressed by the I.M.E.A., that it is illegal to give cash discounts, particularly those who come under the purview of the district audit and who are trading under the 1926 Act. It does appear an anomaly that consumers changing the town they live in find changed conditions under what should be, under the above Act, standard practice.

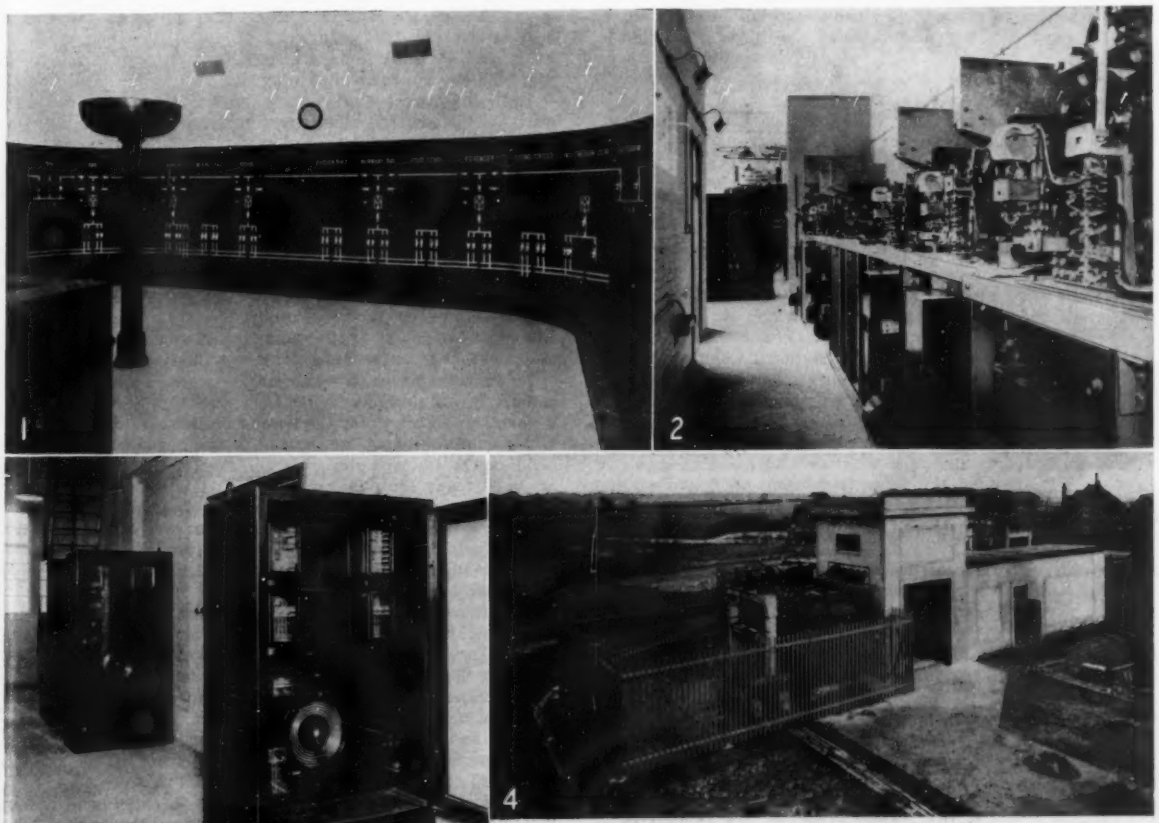
O. G. COOK,
Chief Engineer and Manager,
Bingley, *July 1st.* U.D.C. Electricity Dept.

Alkaline Batteries in France

In an article by Mr. R. Wheatly Minter on page 868 of your issue of June 14th the author states that alkaline batteries have proved unsuitable for vehicle starting and lighting in France. As we are the sole manufacturers of alkaline batteries in France, we feel it necessary to refute strongly Mr. Minter's statement, as it not only casts a reflection on our own product, but also on the alkaline battery industry as a whole.

We have had, for years, a very large amount of cadmium-nickel starting batteries in service for operations such as switch closing, contactors, etc., batteries which furnish currents at equal voltages to those available with lead batteries. For portable use we have marketed, since 1933, a range of cadmium-nickel batteries under the trade mark "Blocacier," more than 12,000 of which have been supplied for the starting and lighting of vehicles fitted with petrol or Diesel engines.

These batteries are in use on all types of road vehicles, motor omnibuses, private motor cars and also special vehicles built to the specification of the French War Ministry. For over two years army vehicles have been fitted exclusively with nickel-cadmium starting and lighting batteries, and the use of



Southern Railway's latest main-line electrification extension (See p. 27)

1. The control room at Ore. 2. High-speed d.c. circuit-breakers and control panels at Newhaven sub-station. 3. Supervisory control equipment at Ore. 4. Typical remotely controlled sub-station at Plympton, showing transformer and 2,500-kW mercury-arc rectifiers with e.h.p. switchgear behind

lead batteries has been prohibited. These vehicles comprise tanks, armoured cars, machine gun vehicles, caterpillars, artillery tractors, travelling workshops and electric welding outfits, and miscellaneous other vehicles. For services of this description we have, at the moment, approximately 300 batteries of miscellaneous sizes in production.

The internal resistance of these batteries is, at least, as low as that of lead batteries. In addition it should be noted that the volume of this type is practically the same as that of lead batteries, and that in the majority of cases we are able to replace a lead battery immediately with a nickel-cadmium battery, without any alteration to the battery compartment.

SOCIÉTÉ DES ACCUMULATEURS FIXES ET DE TRACTION,
Romainville, *June 29th.* A. Vintenon.

Supply Must be Speeded Up

"Observer" is to be congratulated on his outspoken article in your current issue. I take my supply from the authority controlled by the engineer to whom he refers as having suggested at the National Convention that the reduction of prices for domestic purposes was being overdone.

I consume about 6,000 units per annum but my house must remain far from all-electric as I have already gone as far as is economically justifiable in respect of domestic electrification on the present tariff. Indeed, in my heart of hearts, I know that I have gone much farther but, being an electrical enthusiast, it goes against the grain to admit this even to myself.

The tariff is a sliding-scale one based on the number of rooms and is as follows, for two popular sizes of house :—

Rooms.	Units p.a. at 4½d.	At 3½d.	At 1d.
9	306	246	2,250
7	192	156	1,950

All units in excess at ½d.

In the chief town of the district the two primary rates are slightly lower while in the rural districts they are naturally higher. The chief criticism of this tariff is, of course, the large number of high-priced units before a rate of even 1d. is reached. This means that in most cases cooking consumption works out at more than 1d. which is far higher than the ratio of electricity to gas recommended by the E.D.A. Cooking Committee. Moreover, this district must surely be unique in that this ratio of prices for purposes other than lighting is steadily moving in favour of gas, which has been reduced several times, while the two reductions in the price of electricity which have taken place since the inception of the tariff over six years ago, have only affected the higher-priced lighting units. It is a fact that electricity was cheaper ten or twelve years ago in comparison with gas for heating and cooking than it is to-day.

The tariff for heating and cooking for premises other than residences of 2½d. for the first 600 units per annum and 1½d. for units in excess is excellent for obtaining business—for the gas company. The one bright spot is a rate of ½d. per unit for summer water-heating, reverting to the standard tariff for the four winter months.

June 30th. OBSERVER II.

The report just issued by Mr. Yeaman provides an effective footnote to my article in last week's ELECTRICAL REVIEW and to your comments upon it. At the end of 1933-34, the Stoke-on-Trent undertaking announced reductions for nine different classes of supply. During 1934-35 the number of new consumers was 6,898—a record figure and greater than the total number of consumers in 1926 (6,348). Over 20,000 applications for supply were received last year, as against 13,344 for the previous year—an increase of 50 per cent. The new services laid averaged twenty-four per working day.

Even more significant than these results is the fact that the Electricity Committee proposes further reductions in charges. Under the multi-part tariff, the fixed charge of which is based on floor area, all units will in future be charged at ½d., in place of the existing charge of 1d. per unit for the first 240 units and ½d. per unit for additional consumption. In recommending the reductions, the Committee refers to the satisfactory financial position of the undertaking as disclosed in the annual accounts.

A notable feature of the Stoke undertaking is that 6,734,259 units (one-tenth of the total) were sold to pottery kilns, bringing in a revenue of £10,696. Here the average price is 0.38d. per unit. An impossible figure! Worse still, the Michelin Tyre Co. was supplied with 12,768,900 units at 0.261d.

Altogether, Mr. Yeaman must be a thorn in the flesh of the "Dear Unit Brigade." OBSERVER.

July 1st.

The Housewife and the Boiling Plate

Mr. Bailey's experiments on hot plates leave me quite cold. The housewife's opinion of hot plates, and, consequently, only too often her approval or condemnation of electric cooking generally, is based solely on the speed at which she can boil a pint or two of water on a cold plate. Any, to us, interesting data about the value of the retained heat after the initial operation does not interest her at all. What interests her is whether, when she comes home in a hurry for a cup of tea in the afternoon or back from the theatre tired and wanting to take a hot-water bottle to bed, can she get that water quickly?

In my opinion it is a confession of failure to advocate the use of a separate electric kettle. The appeal of the visible heat is not only psychological. There is the very practical value that a visibly hot plate is not left on accidentally after use, whereas the solid plate often is.

And, whilst we are on cookers, how much longer are we to wait for the general adoption of thermostatic control for the oven? Thousands of gas cookers are installed in preference to electric on the advantages of this one feature only. L. F.

July 1st.

The I.E.C. Meetings

AT the closing meeting of the plenary session of the International Electrotechnical Commission at Brussels on June 27th (to which reference was made last week) Mr. James Burke, of the United States National Committee, was unanimously elected President in succession to Dr. Enström. Colonel K. Edgcumbe was re-elected hon. secretary and Dr. Elihu Thomson, a past president of the I.E.C., together with Prof. P. Janet were elected hon. presidents.

It was reported that the Chinese Chargé d'Affaires in Brussels had attended the Council meeting on behalf of the Institution of Electrical Engineers in China, and the Council had approved the formation of a Chinese Electrotechnical Committee to participate fully as a member of the I.E.C. A representative of the Ministry of Communications of Jugoslavia had undertaken to take the necessary steps with a view to his country becoming a member of the Commission.

The proposal of the British National Committee that the next plenary meeting of the Commission be held in England in June, 1938, was accepted by the Council.

The retiring President, Dr. A. F. Enström (Sweden), remarked, *inter alia*, that since the last plenary meeting international relationships had been put under very severe strain. That the I.E.C. had fortunately been able to navigate safely through the waves was due to the close and intimate personal relationships created long ago between its members. Substantial merit was due to the general secretary, Mr. le Maistre.

Mr. J. Burke (U.S.A.) then took the presidential chair and addressed the meeting.

Several sections of an International Electrotechnical Vocabulary have been approved for publication. The fourth edition of the Rules for the Rating of Electrical Machinery (including transformers), together with rules for the measurement of high voltages by means of sphere-gaps, have been agreed for publication. The series of publications on steam turbines has been completed by the adoption of rules on instruments and methods of measurement for use in acceptance tests.

Tentative agreement was reached regarding the standard resistivity of aluminium for electrical purposes. An international specification for the testing of overhead line insulators and a comprehensive comparison of the regulations for overhead power transmission lines in force in different countries are now ready for publication.

The lines along which the international specification for traction motors is to be revised were agreed. A report on the tests which have been carried out by an international subcommittee on insulating oils was discussed, and a programme of further investigations decided upon.

An international specification for electrical measuring instruments was agreed for circulation to the National Committees for approval, and it was decided to set up a committee to study the properties and methods of testing electrical insulating materials. Rules for the marking of the terminals on electrical machinery and apparatus were discussed, and a substantial measure of agreement has been reached. A revised draft specification for the rating and performance of oil-immersed circuit-breakers is to be circulated.

A committee on electrical installations on ships held its first meeting, and a number of sub-committees have been set up with a view to co-ordinating the present practice of the various countries. Good progress has been made in the drafting of an international specification for internal combustion engines. An international specification for the testing of high-voltage paper-insulated lead-covered cables was agreed for circulation to the National Committees for approval.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Long Range Electricity Meters

MESSRS. SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, London, E.C.4, who market the meters manufactured by Messrs. Siemens Brothers & Co., Ltd., are now supplying in addition to their series of short-range meters (*i.e.*, those guaranteed as regards overload capacity to be strictly in accordance with the B.S.S.) long-range types up to 40-A rating.

A Siemens long-range meter with insulated case

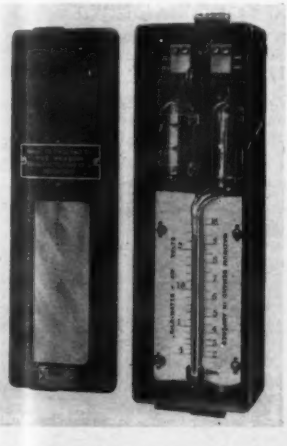
These are designed to have almost straight-line performance characteristics. Their full-load torque is 5 cm.-gm., and the rotor speed at full load is 24 r.p.m. at 200 V. The revolutions per kWh are: 5 A, 1,400; 10 A, 720; 20 A, 25 A and 40 A, 360. The shunt loss is 1.2 W at 230 V, the coil taking 0.02 A, and the series loss is 0.3 W. The 10-A coil has a voltage drop of 0.025 V and a current density of 800 A per sq. in. The weight of the rotor is 22 gm. The meters can be supplied with pointer- or cyclometer-type counters.

The component parts are assembled on a larger edition of the one-piece frame employed in the short-range meters, and this is secured to a substantially pressed-steel base. Standard covers are (*a*) pressed aluminium, (*b*) pressed steel, and (*c*) bakelite, the last being of very substantial gauge and provided with a "skirt" which completely shrouds all metal parts.

When insulated covers are specified the bakelite terminal covers are specially strengthened by webs at the sides and at the point where the captive securing nut is situated.

Maximum Demand Indication

The new type "DOA" maximum-demand indicator produced by the REASON MANUFACTURING CO., LTD., Lewes Road, Brighton, has the same characteristics and accuracy as the older pattern, but it is reduced in size for positions where space is restricted; it employs the same differential thermometer principle of working. Heat produced in a current carrying coil round a bulb causes air expansion in the bulb and forces liquid down one arm of a U-tube and up the other arm to overflow into a reading tube.



The Reason "DOA" maximum-demand indicator

The case is of sheet-steel, rust-proofed and stoved black, and the cable entries are ebonite bushed. The sheet-steel lid has a glazed window through which the reading tube and scale are plainly visible, and it may be either opened downward by a hinge or removed altogether.

An improved resetting hinge is so designed that it will hold the tube in the resetting position. The trap in the older pattern indicator immediately below the heating bulb for preventing transference of air from one bulb to the other, has been replaced by a pocket extending into the bulb itself. The equipment is made in seven sizes from 1 to 20 A, and the overall dimensions are 11¼ in. by 3¼ in. by 2⅛ in.

An Improved Cleaner

An air flow of 45 cu. ft. per minute and a water column lift of 50 in. is claimed by BRITISH ELECTRIC DOMESTIC APPLIANCES, LTD., 3, Hanover Court, Moor Lane, London, E.C.2, for its new "Bedalux" vacuum cleaner. The cylindrical body of the machine is principally of bakelite covered with green and gold rexine, the metal parts being heavily chromium plated. The motor is quiet running, being mounted on rubber. A special feature is a swivel arrangement on the front dust bag cover to prevent kinking of the cable.

The equipment includes seven feet of braided flexible tubing and angle and straight extension tubes. Besides a swivel carpet nozzle with a special device for picking up cotton there are triangular and rectangular wooden brush attachments, a polished aluminium one for upholstery, a chromium-plated crevice and blowing nozzle and two air purification pads. All the equipment can be packed in a neat box which is supplied with the machine. There is a removable tray for the accessories.

The "Bedalux" electric vacuum cleaner with accessories and case

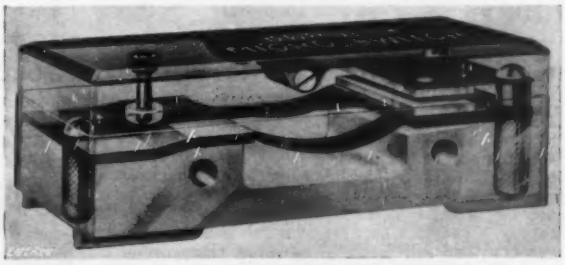
A Light-construction Cooker

An addition to the range of "Nippy" cookers produced by MESSRS. BERKELEY & YOUNG, LTD., Tyseley, Birmingham, 11, is the "Silver Jubilee," with a sheet-steel body and a cast-iron hob. It is supplied complete with a tubular stand fitted with a shelf for pots and pans. The hinged hob, which lifts up complete with the boiler-griller and the switchbox, renders the element and the wiring particularly accessible. The boiler-griller also serves for top oven heating and there is a separate 500-W element at the oven bottom. The warming cupboard under the oven is another "Nippy" speciality.

The "Silver Jubilee Nippy" cooker

A Miniature Switch

The Burgess "Micro Switch" depends for its action upon a change in the relative tension of opposing springs which cause two silver plates to separate or come together with a positive snap action. The stationary silver contacts are mounted on beryllium copper springs and follow the motion



A "ghost" view of the Burgess "Micro Switch"

of the moving contact until the springs effect their sudden separation.

The movable contact mounted on the main spring system is held against the upper limiting stop; with the normally closed switch, this stop is the stationary electrical contact, while in the normally open unit it is insulated. A pressure of fourteen ounces applied to the operating plunger depresses it until the springs upon which the moving contact is mounted cause that contact to leave the upper stop suddenly. When the pressure acting upon the plunger is reduced to ten ounces the plunger is raised, whereupon the moving contact leaves the lower stop smartly and makes contact with the upper stop. The difference in pressure which brings about the operation of the switch is thus only four ounces. The switch is designed for duties of 5 A at 230 V a.c., inductive or non-

inductive circuits, operating up to five times per second, or twenty times with lower currents and voltages. It is shortly to be manufactured in Great Britain by the BURGESS PRODUCTS, LTD., Barwell, Leicester.

An Adjustable Desk Lamp

Although there are no thumb screws to be turned practically any position or angle can be obtained with the "Adaptolite," an adjustable desk lamp of unusual design which is being marketed by MESSRS. L. G. HAWKINS & Co., LTD., 30, Drury Lane, London, W.C.2.

The up and down movement is effected by pressure alone; this overcomes the action of a coiled spring which normally grips the vertical stand but permits a radial movement. In addition, a forward adjustment is provided for, and there is a ball joint near the lamp itself. Black, green or ivory and chromium finishes can be obtained, and an examination of the equipment showed it to be robustly constructed with a heavy, rigid base.

The "Supreme Adaptolite"

A Flex Lead Suppressor

The Belling-Lee flex lead suppressor

An interference suppressor which has been designed for insertion into the leads of the appliance causing the trouble has been developed by MESSRS. BELLING & LEE, LTD., Cambridge Arterial Road, Enfield. This type of suppressor is intended for use with vacuum cleaners, hair dryers, fans, &c., which are operated from a two-pin plug, the device consisting of a 0.1-mF condenser, tested to 1,500 V, which is connected across the mains, and a 0.01-mF condenser, tested to 2,250 V, connected between one pole and earth. Both are contained in a neat bakelite case. Pillar-type terminals and efficient cord grips are provided.

An Unusual Electric Washer

In place of the normal gyratory action the "Magic" vacuum cup electric washer marketed by MESSRS. MACGREGOR & MCCALLUM, LTD., Dominion House, Thames Rd., Chiswick, W.4, has an ingenious arrangement of vacuum cups designed to reproduce the action of human hands. The device comprises three nickel-plated washing cups which, in action, rise, make a partial revolution, and then fall on a different part of the wash. This action causes the warm suds to be squeezed and sucked through the clothes as in hand laundering. The cups are strong but light and have smoothly rounded "fingertip" rims to avoid damaging any delicate materials.

The vacuum-cup washer

The washer has a seamless porcelain - enamelled tub with a capacity of 6 lb. of dry clothes. The machine includes a cadmium-plated reversible electric wringer, adjustable to six different positions, and is fitted with a safety release.

Operation is by means of a quiet ½-h.p. electric motor, all mechanical parts being enclosed. There is also a large model, the "Magic Major," holding 8 lb. of dry clothes and with a large wringer.

Valve Rectifiers

The Gordon rectifiers described last week are sold by MESSRS. F. J. GORDON & Co., LTD., 114, Euston Road, N.W.1.

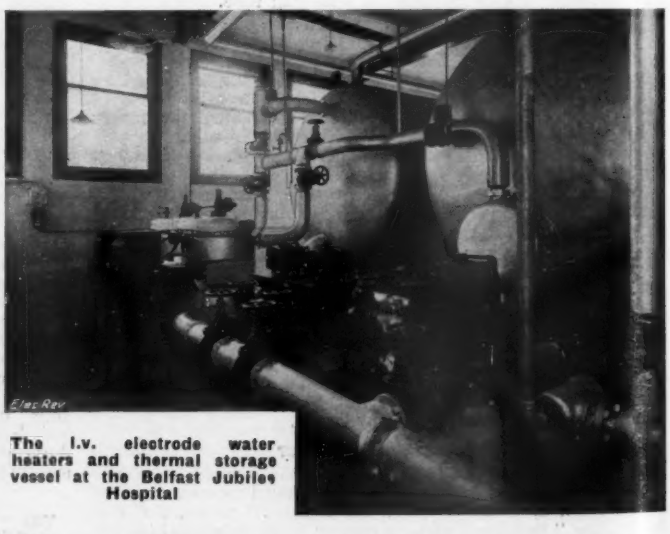
Low-voltage Electrode Water Heating

A THERMAL storage installation at the Belfast Union Jubilee Maternity Hospital for central heating and for domestic hot-water supply employs a type of low-voltage electrode water heater recently introduced by Messrs. A. Reyrolle & Co., Ltd. Two identical heaters each have a loading of 200 kW and are suitable for direct connection to a 400-V, three-phase, four-wire, 50-cycle supply. They are capable of regulation down to 30 per cent. of full load by movable porcelain electrode shields of the plate type. These are carried on a common framework which is automatically motor-operated through internal rack and pinion mechanism and external reduction gear. A hand wheel provides for manual load regulation if it is required at any time. The electrode terminals are brought out at the base of the heater and connected by robust copper bus-bars to a dividing box on the side of the shell. Each heater is also equipped with a spring-loaded relief valve, an air cock, inlet and outlet valves, a drain valve, a safety pressure switch and a thermostat.

The heaters feed two 4,000-gal. storage vessels, one of which serves to heat the building during the peak or non-charging period, while the other provides the domestic hot-water. The latter vessel is hydraulically isolated from the heaters, the transfer of heat being by means of an exchanger-coil built into the vessel. The storage-temperatures of the vessels are 220 deg. F. and 160 deg. F., respectively, and since both of them may be connected to one or both of the heaters at the same time special thermostatically controlled magnetic valves are fitted in the flow-pipes. When the temperature of the water in either of the vessels reaches a value which corresponds to the setting of the thermostat the magnetic valve closes and stops the flow to that vessel. When both valves are closed, the heater-load is reduced automatically to its minimum value and the circuit-breakers controlling the supply to the heaters are opened—while when the temperature of the water in either vessel falls again below the thermostat setting the magnetic valve reopens and the heater is automatically put on load again.

Three pumps are so arranged that one serves the building system, another the heaters, and the third is a standby. In an emergency one pump can serve both sections.

Because the demand for domestic hot water is continuous and the building has to be heated, as a rule, only in winter, the auxiliary switching-controls are so arranged that the magnetic valve in the flow-pipe to the storage-vessel for the building can be de-energised, and so closed, by a single tumbler-switch, without interfering in any way with the automatic working of the plant for domestic hot water supply.



The l.v. electrode water heaters and thermal storage vessel at the Belfast Jubilee Hospital

Centralised control is provided by duplicate panels equipped, *inter alia*, with remote indicating and controlling equipment for the switchgear and load regulating apparatus. Overall control of the installation is by time switch.

Apart from this thermal-storage installation there is a 35-kW, 400-V, three-phase automatic electrode steam raiser for sterilising in the hospital and a thermal-storage equipment with immersion heaters in the adjoining nurses' home.

Brighter Prospects in Argentina

A promising market despite growing local competition

MORE hopeful news regarding the economic conditions in Argentina comes to us in a Department of Overseas Trade report (H.M. Stationery Office, 4s. 6d.) prepared by Mr. Stanley G. Irving, C.M.G., Commercial Counsellor, H.M. Embassy, Buenos Aires. After the long period of struggle and retrenchment the efforts of the government and the people began in 1934 to show positive results. The improved condition of the agricultural and pastoral industries, together with the reduction of 20 per cent. in the exchange value of the peso at the end of 1933, contributed greatly towards a national recovery.

A feature of the domestic economic revival is the rapid development of national manufacturing. The contraction of her principal markets has caused Argentina not only to seek fresh outlets for her exports, but also to find means of producing an increased proportion of her requirements at home. As neither coal nor iron is found in workable quantities and as no water power is available, the iron and steel industry is developing much more slowly than that of textiles. Nevertheless, important progress is being made in such items as cables, cookers, refrigerator housings and radio accessories.

Lower British Quotations

Most of the country's requirements in electrical machinery and apparatus still, however, have to be supplied from abroad. Although during the past twelve months heavy plant has not been in demand and no installations of importance have been carried out, a few inquiries for electrical plant of medium sizes have been issued by Government departments, power companies and privately-owned concerns. Several orders have been placed on the Continent, but British manufacturers having quoted more competitive prices lately may reasonably expect to benefit from the improved demand.

On account of the maintenance of the 10 per cent. surcharge on import duties and by importers' exchange difficulties, many of the existing factories, especially those for producing textiles, have carried out important extensions, and several new factories have been established. An appreciable increase in the demand for electrical plant has accompanied this expansion, a fair share of the additional orders being secured by United Kingdom firms. Orders for control apparatus are usually placed with the manufacturers of the plant. The gear supplied by British makers suits local requirements and has earned favourable comment.

During the first half of 1934 there was a marked increase in the imports of electric cables and wires compared with the corresponding period of 1933, as the following official statistics show :—

	Quantities in kilos. 1933. (1st 6 months).	1934.
Electric cables up to 5 mm. without lead or silk cover ...	116,609	292,826
Electric cables over 5 mm. without lead or silk cover ...	45,192	178,927
Electric cables, lead covered up to 5 mm.	17,059	115,037
Electric cables, lead covered over 5 mm.	103,390	282,891
Electric cables silk covered	934	2,380
Other electric cables	162,262	240,624
Flexible electric wire, not silk covered	10,510	20,268
Flexible electric wire, silk covered	566	986

Although United Kingdom manufacturers still retain a substantial share of the trade in wires and cables, competition from the two local factories is growing ever keener. Paper insulated armoured cables are now being manufactured in the country, though they do not as yet compete in quality with the corresponding imported cables. Practically all the large contracts for l.p. and h.p. armoured cable placed during the year were awarded to German, Dutch or Scandinavian manufacturers, who invariably underquoted British offers on identical specifications by more than 20 per cent.

Electric irons, cookers, toasters, kettles, plugs, switches, lamp sockets, &c., are imported principally from Germany, the U.S.A. and Italy, only small quantities coming from the United Kingdom. There is also a considerable local production of electrical goods, especially heating apparatus and small cooking stoves.

Imports of incandescent lamps from the United Kingdom have been gradually increasing due to the sale of non-ring makes. Japanese manufacturers competed very strongly against E.L.M.A. lamps in 1933, and by quoting prices roughly 50 per cent. below secured half the total business. Owing, however, to exchange difficulties, extensive E.L.M.A. advertising, and the inferior quality of the Japanese products, Japanese sales dropped during the first five months of 1934 to a quarter of the volume for the corresponding period of 1933. The quality handicap is now, however, being reduced, and it will not be surprising if Japan makes another successful assault on the market.

Though the United States and Denmark have hitherto held the trade in dry cells, a British company is now making successful efforts to secure business with a new type specially adapted to the conditions of the market. There is also keen local competition, but the inferior quality of the products limits their popularity. In the towns the sale is falling off owing to the growing demand for mains-operated radio receivers.

Throughout the depression radio has made rapid strides and the trade has received an added impetus recently as a result of a general reorganisation of the local broadcasting programmes, combined with improvements in transmission. Sales of both mains and battery sets have been considerable during the past year; in particular, greater interest has been shown in 5- and 7-valve superhet battery sets for use where no electricity supply is available.

Radio apparatus imports, which are confined to the more expensive types, amounted to 83,049 kilos for January-June, 1934, as compared with 63,318 kilos in the corresponding period of the preceding year. Most of these imports were of U.S.A., German or Dutch origin, largely because the British sets cost 30 to 40 per cent. more and because, being of more solid construction, are liable to more import duty. The bulk of the demand is, however, supplied by local manufacturers who build up their sets from both imported and local made component parts.

Radio Accessories

Sales of radio accessories have continued active, the heaviest turnover being in American and German products. Valve imports in the first half of 1934 rose from 709,907 to 851,886 units, as compared with the corresponding period of 1933, the principal suppliers being the U.S.A., Holland, Germany and to a smaller extent the United Kingdom. Imports of accessories improved only slightly in value from $1,159,748 to $1,184,437 pesos paper. The local production, while still smaller, is increasing. Partly owing to exchange being obtainable at the tender rate, buyers have recently been turning more and more to British manufacturers who have been quoting competitive prices for goods which have given entire satisfaction. British condensers, resistances, wound coils, dials and pick-ups have been especially successful. More attention should be paid to packing so as to reduce weight and consequently import duties. Lately accessories from Japan have been offered at incredibly low prices but of very poor quality.

Having regard to the improved economic situation and to the fact that further industrialisation is inevitable, the general prospects of this market from the electrical point of view are distinctly promising, more so than they have been for years. The important and comprehensive programme of public works to be spread over six years commencing in 1934 provides additional reason for anticipating an active demand for electrical equipment in the near future.

New Books

Faraday's Diary. VOL. VI. Edited by T. MARTIN. Pp. 493; illus. London: G. Bell & Sons, Ltd.

There can be nothing but praise and gratitude to all concerned for this valuable accession to scientific literature. The work as a whole is to comprise the various philosophical notes of experimental investigation made by Faraday during the years 1820-1862, as recorded in his manuscript diaries.

The period covered by Vol. VI (November 11th, 1851-November 5th, 1855) was that in which he brought his earlier work upon magnetism to a focus and extended it by closer study of lines of force, the law of distance, magnetic measurements on gases and liquids, magnetism of gases at low temperatures, magnetic experiments with crystals, the measurement of magnecrystallic force with torsion apparatus, and the effect of heat upon magnecrystallic properties of various bodies. It is to be observed that Vol. VI of the Diary carries the investigations beyond the last date (February 7th, 1855) mentioned in the third and final volume of Faraday's own printed record, "Experimental Researches in Electricity." Readers of the present work will therefore appreciate the care that the editor, Mr. Thomas Martin, has bestowed upon obtaining cross-references to prime journals for the investigations beyond February, 1855.

In addition to its wealth of information and the inherent

quality of inspiring thought and action towards further research, this volume is especially charming on account of Faraday's original sketches in the margins, and because of the excellent selection of collotype reproductions of the actual lines depicted by the use of iron filings sprinkled in the neighbourhood of magnets by Faraday himself. Here, too (page 53), is a sketch of the hemisphere of nickel with which he examined the effect of heating upon the magnetic state of that metal. On page 55 is his sketch of a magnetic needle attached to a small piece of silvered glass suspended by a single cocoon fibre. On page 75 is a somewhat similar arrangement for a magnetometer. On page 126 he is found to be troubled by the vibrations from the passing of carriages along Albemarle Street. At page 130 he is at work with "the great electro-magnet." At page 136 there is complaint (August 30th, 1852) of "imperfect eyesight." On page 399 is his own sketch of the apparatus whereby he demonstrated the oscillatory character of the discharge from a Leyden jar in an interrupted circuit. Look where you will, the Diary throws light upon the life and work of the great philosopher.

* * *

Shorter Notices

"The Gantt Chart," by Wallace Clark (Pp. 32+146). London: Sir Isaac Pitman & Sons. Price 7s. 6d. net.—This type of chart (named after H. L. Gantt, a pioneer in scientific management) relates time with the amount of work to be done and compares the arranged programme with the actual accomplishment. It can be applied in numerous ways to a diversity of industries, and Mr. Clark deals with the subject in a very comprehensive way. One particularly electrical application is to furnaces in an alloy-steel mill; in this case the charts have been used to enable the work of each unit and the whole group to be visualised with a view to fitting in the varying amount of work with the capacity of the furnaces.

"Business Charts," by T. G. Rose, M.I.Mech.E. (Pp. 32+94). London: Sir Isaac Pitman & Sons. Price 7s. 6d. net.—In recent years the value of recording business facts and trends graphically has become more generally realised. Charts are more easily read than columns of figures, and enable a position to be seen at a glance—if they are properly prepared. The author's aim is to show how various types of charts—circle, line, bar, etc.—should be made and he does this in a readable and understandable fashion. We do not, however, share his opinion that pictorial charts are totally useless, although their value in business is perhaps questionable.

"Noise—A Comprehensive Survey from Every Point of View," by N. W. McLachlan. Pp. 148; figs. 52. London: Oxford University Press. Price 6s.

In the Courts

AT the Liverpool Assizes last week Arthur Lumb, a Liverpool City Councillor, was fined £50 for corruptly soliciting reward as a business inducement; he was also disqualified from holding any public office for a period of seven years. The defendant appeared on two charges, one of which related to the sale by the Council of plant from the Marsh Lane power station. In passing sentence Mr. Justice Greaves-Lord said that he did not regard Lumb as being wilfully dishonest; the correct description of him was that he was a "blundering fool."

Assisted Wiring at Liverpool

During the hearing of summonses at the Liverpool Police Court, against householders for the non-payment of electricity accounts, one of the justices had piquant comment to make on the manner in which the assisted-wiring scheme is operated. Some defendants stated that when their houses were wired the canvasser for the wiring contract declared that their obligation would cease when they gave up the tenancy of the house. In point of fact, they now discovered that they were still liable unless the new tenant agreed to continue the instalment payments. In one case brought before the Court three different persons had signed an agreement accepting responsibility for the payment of the wiring costs.

The chairman of the Bench pointed out that if the first agreement was not legally cancelled the others could not possibly be upheld. If the obligation was transferred it must be done in a proper legal fashion. According to this magistrate, a canvasser could book an order from a tenant and himself pay to the Corporation the deposit of £2. On the wiring order being executed he received payment from the Corporation at the rate of 19s. per lighting point, leaving the Corporation to collect the money from the consumer.

In some cases orders were made for the payment of outstanding accounts, and other cases were adjourned for further consideration.

A Radio Patent Application

In the Chancery Division on July 1st Mr. Justice Luxmoore had before him a petition by Messrs. E. K. Cole, Ltd., Southend-on-Sea, to reverse a decision of the Comptroller-General of Patents on an application made by them in proceedings by Standard Telephones & Cables, Ltd., to amend their patent No. 259664 for an invention entitled "Improved Gain Regulator of Thermionic Amplifiers," granted in July, 1925, to the Western Electric Co., Ltd., which subsequently changed its name to Standard Telephones & Cables, Ltd.

Mr. Graham, who appeared for the petitioners, said they opposed the application to amend, and submitted that the proposed amendments were not permissible in law and that the Comptroller-General, in view of the conduct of the patentees as holders of the monopoly rights, should not have exercised his discretion in their favour. The two issues raised were whether the application was *bona fide*, and, if so, whether the amendments were permissible. The petitioners alleged that the patentees from 1925 had pursued a policy in connection with the exploitation of the patent in the suit and of other patents, which constituted an abuse of monopoly rights. It was also alleged that they had issued threats to the trade on the patent.

The petitioners asked for an order on the patentees to give discovery of documents as to the issue of *bona fides*. The Comptroller-General dismissed the application, saying that he ought to be satisfied whether a *prima facie* case had been made out that the policy alleged had been followed in connection with the patent in the suit, and he felt there was not sufficient ground to justify an order. The petitioners now appealed from that decision.

Mr. Mould, for Standard Telephones & Cables, Ltd., said that the discovery asked for was quite irrelevant, and the request to have a roving commission over his clients' patents was outrageous.

In the result his Lordship held that the petition was out of time, and as there were no necessary reasons for extending the time for appealing, he dismissed the petition and made an order accordingly.

Winding-up Order

In the Companies' Court on July 1st Mr. Justice Eve had before him a petition by Berry's Electric, Ltd., for the compulsory winding-up of Ridout & Ratcliff, Ltd., electrical engineers and contractors, 129, Crawford Street, W.

Counsel stated that this was a judgment creditor's petition for goods supplied. A receiver for the debenture-holders had been appointed. There was no opposition and his Lordship made the usual compulsory order.

Parliamentary News (BY OUR SPECIAL REPORTER)

IN the House of Commons last week Mr. Summersby asked the Minister of Transport if and when a commencement would be made on the electrification of the railway to Portsmouth and to the intermediate towns on the South Coast.

Mr. Hore-Belisha said that the Southern Railway Company informed him that it had arrived at no decision with regard to the electrification of the railway to Portsmouth.

The Wirral Railway

On June 26th Mr. Cleary asked the Minister of Transport whether he was prepared to consider the granting of financial assistance for the electrification of the Wirral railway system.

Mr. Hore-Belisha said that the Government had already intimated its willingness to consider any useful schemes of this kind which might be put before it, but the initiative must necessarily rest with the undertakings concerned.

Proposed Electrification in Lancashire

Mr. Chorlton asked the Minister of Transport whether, in view of the favourable arrangements made with regard to railway electrification in the London district, he would convey to the railway companies concerned in South Lancashire his willingness to consider a combined scheme of electrification for that district to extend those already existing.

Mr. Hore-Belisha repeated his reply to Mr. Cleary, regarding the Government's willingness to consider financial aid for any suitable scheme if requested by the promoters, and said that, as regarded the particular area to which his hon. friend referred, he had already been in communication with the companies and understood that a joint examination of the possibilities of electrification of the lines concerned was being made by them.

Wireless Revenues

On June 26th, in reply to Mr. R. Evans, Major Tryon, the Postmaster-General, said that the total revenue from the sale of wireless receiving licences from January 1st, 1927, to March 31st, 1935, was £17,995,000, which was distributed as follows: Exchequer, £6,193,000; Post Office, £1,990,000; British Broadcasting Corporation, £9,812,000.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments. Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Ismay (Rawson), Ltd.

Messrs. H. C. Rawson (Sheffield & London), Ltd., have changed their title to Ismay (Rawson), Ltd., owing to the recent reorganisation of the company and to the concentration which has just taken place of themselves and their associated companies at Sterling Works, Dagenham.

Scientific Management

The Sixth International Congress for Scientific Management will be opened on July 15th at the Central Hall, Westminster, by the Prince of Wales, its Patron. Many national bodies are actively concerned in the organisation of the Congress, including the Federation of British Industries, the Association of British Chambers of Commerce, and the Institutions of Civil and Mechanical Engineers. Among those who are taking part are Sir George Beharrell (chairman), Lord Hirst, Sir James Lithgow, and Sir David Milne-Watson.

South African Market for Refrigerators

South Africa has become one of the largest buyers in the world of exported refrigerators. The distinction is shared by England. A survey by a United States authority of the world's refrigerator market discloses further that in September last more refrigerators were shipped to South Africa than to the entire American export world in 1929. A prominent hardware merchant in Pretoria declares that the Union, at the moment, is one of the best markets in the world for nearly all commodities, owing mainly to the prosperity of Johannesburg.

New Municipal Showrooms

The new showrooms of the Colchester Corporation Electricity Supply Department at Manningtree were officially opened by the Mayor of Colchester (Councillor A. H. Cross) on June 24th. They are in the centre of an area of supply of about 260 sq. miles. The new building comprises showrooms, offices and living accommodation for the manager (Mr. W. Andrews). At the opening there was a display of the latest types of electrical apparatus. Alderman A. Owen Ward, chairman of the Electricity Department, who presided, said they still felt they were a long way from saturation point.

Barnsley Town Council is to lease new premises at the corner of Eldon Street, and Kendray Street, for use as electricity showrooms.

B.T.H. Apprentice Day

Sir Felix and Lady Pole were among the 250 visitors at the seventh annual Apprentice Parents' Day at the Willesden Works of the British Thomson-Houston Co., Ltd. This function is primarily intended to enable the parents and supervisors to meet on common ground, and to give the parents some idea of the work done by their sons, and their progress. The visitors were first taken for a tour of the works, including demonstrations in the e.h.p. laboratory, where the two most popular "turns" were a 500-kV discharge between needle points and the destruction of a model church steeple by lightning (provided by the impulse generator). At the conclusion of the tour the visitors were welcomed by the manager, Mr. A. Easthope. Mr. H. Trencham (consulting switchgear engineer) commented upon the entries for the essay competition, open to all apprentices and ex-apprentices not more than one year out of their time, upon any engineering or allied subject, for which diplomas are awarded for the best paper in each class, and the "Easthope" medal for the best paper of the year. Sir Felix Pole announced the winners and presented the prizes. After tea the visitors were entertained by demonstrations of photo-electric phenomena. The proceedings terminated with an informal dance.

Sir Felix Pole presenting the "Easthope" medal to Mr. F. Thornton at Willesden

Trade Questions in France

A recent congress of wholesalers of electrical apparatus in Paris considered several questions of interest to the electrical industry, especially the relations of the consumer with electrical contractors and the retailers of electrical apparatus. The congress expressed the wish that a law should be passed to make it obligatory to have all electrical installations inspected regularly by a licensed electrician—at the expense of the users. The spread of selling of apparatus by distribution companies or their subsidiaries also attracted the unfavourable attention of the congress, which would have the distribution companies "mind their own business of selling current." The wholesalers would also like electrical distributors to discontinue the practice of installing large pieces, such as ranges, as they often do now. They have no objection to their quoting approximate costs of installation, but would have the work done by contractors privately engaged by the consumer.

An Electrical Carnival Tableau

At the recent local hospital carnival at Swindon, the Corporation Electricity Department entered a decorated vehicle which secured the first prize. The accompanying illustration is reproduced from a photograph sent us by Mr. A. Nicklin, the borough electrical engineer and manager, and shows the attractive lay-out of the vehicle.

The Swindon prize-winning tableau

Reduction in Railway Rates

The four railway groups announce that simplified scales of owner's risk charges have been introduced for parcels up to 15 lb. in weight conveyed by passenger train. The new scales will apply between all stations in Great Britain including the Channel Islands and Isle of Man, where through bookings are in operation.

Chilian Import Duty Reduction

A recent Chilean decree, published in accordance with the provisions of the Chilean Customs law, reduces the import duty on telephone transmitters and receivers from 5 to 3.65 gold pesos per legal kg., and that on telephone, telegraph and radio transmitting apparatus, not specified, from 0.35 to 0.25 gold peso per gross kg.

Exhibition of Inventions

The eleventh International Exhibition of Inventions will take place in the Central Hall, Westminster, S.W., from October 2nd to 12th next. This exhibition will be transferred to St. George's Drill Hall, Newcastle-on-Tyne, from November 20th to 30th inclusive.

Electric Cable Manufacture in Algeria

Although Algeria is mainly agricultural, a number of industries have been established in recent years. Among these is that of electric cable manufacture, the exports of which in 1933 reached a total value of £442,300. Owing to the general industrial depression, however, the shipments during last year amounted to only £181,500.

Works Visit

On June 24th a party of Danish electrical engineering students from the Polytechnical College of Copenhagen, who are visiting this country accompanied by Professor A. K.

Aubeck, visited the works of the Micanite & Insulators Co., Ltd., at Walthamstow. The students were met at their hotel and conveyed to Walthamstow by motor coach, and were then conducted round the works in parties. All departments of the factory were visited, as well as the drawing office, chemical laboratory and high-voltage testing laboratory, and a spectacular high-voltage display in the latter was arranged as a conclusion to the tour of the works. Refreshments in the staff canteen followed, and the party then returned to London by motor coach.

Machine Tool Drive

An interesting example of modern machine-tool drive has recently been installed in one of the works of Messrs. Ambrose Shardlow & Co., Ltd., of Sheffield. The machine-tool equipment comprises a battery of vertical-crankshaft turning machines, which are installed in a new factory recently erected

Machine tools at Messrs. Ambrose Shardlow's works showing main driving motor, contactor equipment, &c., supplied by the G.E.C.

adjacent to the company's drop-stamp forge at Wincobank. The main operations performed consist of the machining and finishing of motor car engine crankshafts. In order to ensure rapid and efficient production of the specialised character required, Messrs. Shardlow's engineers developed the necessary machine tools, collaborating with the General Electric Co., Ltd., in connection with the electrical driving equipment, which was designed and manufactured at the G.E.C. engineering works, Witton. The form of automatic electric drive utilised involved for each unit the provision of a 5-h.p. and a ½-h.p. motor, together with contactor control equipment, shunt regulators, push-buttons, &c. The speed range of the 5-h.p. motor is 600/1,000 r.p.m., and that of the ½-h.p. motor is 600/1,800 r.p.m. The automatic contactor gear is housed in a steel cabinet mounted behind the machine and can be seen in the accompanying illustration.

Orders Recently Booked

One of the largest contracts ever placed in this country for electrically driven rolling-mill equipment for a British steelworks mill has just been awarded by Messrs. Dorman, Long & Co., Ltd., to the General Electric Co., Ltd. This order, which is valued at approximately £100,000, follows the recent completion of several other important steelworks electrification schemes, notably in South Wales and Yorkshire. The equipment to be installed comprises the latest designs in this class of gear, and will include a complete mercury-arc rectifier unit, one of the first of this type to be installed in a steelworks. Of the electric motors which will be required, the largest is of 17,000 h.p. for driving a cogging mill. The shaft and armature of this machine will weigh about 35 tons, and, in the course of its duty, will be reversed from full speed in one direction to full speed in the other direction within approximately ten seconds. The whole of the equipment will be manufactured in the General Electric Co.'s engineering works.

Recent cable orders received by British Insulated Cables, Ltd., include 24,000 yds. of various e.h.p., h.p., and l.p. cables for Norwich, 16,600 yds. of h.p. and l.p. cables for the Midland Electric Corporation, and the supply and laying of 7,200 yds. of l.p. cable for a development company in West London. Other recent orders include 48,000 yds. of hard drawn copper stranded conductor for the Electricity Board of Northern Ireland.

Heavy-current Batteries

For the past two years C.A.V.-Bosch, Ltd., Acton, W., have been concentrating on the production of a battery particularly suited to the demands of compression-ignition heavy oil engines, which require extremely heavy current when starting. The problem was to produce a battery which would combine the highest possible output with the longest life, and it is claimed that this has been achieved in the S and L types of "C.A.V.-Nife" alkaline all-steel cells, which carry a standard guarantee of six years' minimum life. The weight and volume have also been appreciably reduced; as compared with a standard acid-type cell, the weight is 360 lb. against 616 lb. and the volume is 7,100 cu. in. against 7,320 cu. in. It is stated that the saving in weight of a new battery for an oil-engined motor bus or coach amounts almost to that of two passengers.

Another problem which is being tackled with the aid of non-acid cells is that of moving trolley buses when obstructed by street traffic, which involves the removal of the collector pole from the overhead trolley wire. For this purpose the London Passenger Transport Board is experimenting with all-steel alkaline cells supplied by Batteries, Ltd., of Redditch. They are operated in series-parallel, so that while normally employed for lighting the vehicle they can be reconnected to drive the bus for a short while.

Methods of Trading in Norway

The Department of Overseas Trade has issued a confidential memorandum to firms in its Special Register on the appointment of agents and the best methods of trading in Norway, prepared by the Commercial Secretary to H.M. Legation at Oslo. United Kingdom firms desirous of obtaining a copy of this memorandum, together with particulars of the Special Register should apply to the Department at 35, Old Queen Street, S.W.1, quoting reference C.Y.4522.

German Radio Imports and Exports

Official returns show that the imports of radio receiving sets and cognate material into Germany during the three months ended March last attained a value (12.25 Reichsmarks to the £) of £163,020, as compared with £217,875 in the corresponding quarter of 1934. There was also a decline during the same period in the exports of similar material from £524,325 to £429,795.

Colliery Pumping Plant

The Victoria Pit, West Wemyss, Fifeshire, reputed to be the oldest working colliery in Britain, has just installed two electric turbine pumps which can deal with 1,200 gals. per minute. The old pump was at the pithead and had been in constant use since 1867. Electric winding engines will be introduced in the near future.

The Dublin Wireless Exhibition

At the request of the Dublin Corporation, and in order to assist the Irish Hospitals Trust authorities, who require temporary accommodation at the Mansion House, Dublin, it has now been decided to hold the annual Irish Wireless and Gramophone Exhibition from September 9th to the 14th next, and not from September 16th to the 21st as previously arranged.

"Poor Old Gas!"

Mr. E. Shiell, of Langholm, presiding at the annual general meeting of the Waverley Association of Gas Managers at Edinburgh, on June 28th, said that most of those present were competing with electricity, some of them for a long time past, and in summing up the position several conclusions had been forced upon him. The majority of the people he met were firmly convinced that electricity was the light and fuel of the future, and that it was only a matter of time before gas was superseded. Until that misguided opinion regained its balance they must never relax their efforts in gas salesmanship, no matter how insignificant the opening might be. Wireless had proved a deadly enemy, and when prospects of electrifying a house were under consideration poor old gas was made the scapegoat for battery charging expenses.

The Tir John Power Station

In our notes on this station in our last issue the "Radicon" drives supplied by Messrs. David Brown & Sons (Huddersfield), Ltd., for the conveyors, etc., were, by a printer's error, termed "Radicorn" reducers—savouring more of chiropodical than power station practice.

The pump illustrated on page 935 was described as a main feed pump. The plant was, however, one of the lift pumps supplied by Messrs. G. & J. Weir, Ltd. Messrs. Weir inform us that the main feed pumps embody Vulcan-Sinclair hydraulic couplings.

Social Events

The perfect weather last Saturday drew a gathering of over 1,700 people to the London and Home Counties Joint Electricity Authority's second annual sports day at Thames Ditton. The Sports Association issued a time-table of twenty-four events to visitors, and the programme was finished almost dead on time, which speaks well for the work of Mr. S. H. Harvey, the sports ground secretary, and of the organising committees. After the sports the Boys' Brigade gave a display, followed by the presentation of prizes by Mrs. Chuter Ede, and a variety turn by the Dorking branch. In the cool of the evening there was dancing on the green.

The annual sports meeting of Callender's Athletic and Social Club was held at the company's sports ground, Erith, on Saturday last. There was a full afternoon's programme, and a notable feat was that of Miss K. Tilley (Mitcham L.A.C.),

who created a Southern Counties record in the W.A.A.A. shot-putting championship with a put of 32 ft. 8 in.

For Sale

Messrs. Goddard & Smith will sell by auction at 70, Seymour Place, Bryanston Square, W., on July 17th, the stock of an electrical warehouse.

Walsall Electric Supply Department invites offers for the purchase of surplus plant.

(See our classified advertisements.)

A Fan Window Display

The Hotpoint Electric Appliance Co., Ltd., has sent us a photograph of a window display recently installed in the window of Crown House, adjacent to its Crown House showroom, Aldwych, W.C.2. The display is designed to exhibit the "Bandolero" safety fan. The background of the screen is of wavy blue, indicating coolness. A woman's figure is cut out and the fan blowing on it produces a movement in the scarf round her neck. Two showcards at the side of the display indicate some of the main selling points of the fan, while two small showcards in front illustrate the King's House for which these fans were chosen. Similar displays are available for the trade.

Tin Consumption

According to the June issue of the *Bulletin* of the International Tin Research and Development Council, issued by the Hague Statistical Office, the consumption of tin in manufacture during the first four months of the current year totalled 46,400 tons, against 43,800 tons and 35,900 tons respectively in the corresponding months of 1934 and 1933. This year's consumption has increased by 6 per cent. over last year, and the figures show that the increase is very largely due to the expansion of the tin consuming industries in the United States of America. During the year ended April, 1935, the world used 132,600 tons of tin against 138,900 tons in the previous year. The fact that these figures indicate a decrease of 4½ per cent. when world consumption is increasing, is explained by the exceptionally heavy imports of tin into the United States during 1933.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances.

CHEMICALS, ETC.	Price, July 3rd.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£36	—
a Ammonia, Muriate (large crystal) ... ,,	£18 10s.	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£15 10s.	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate... ... ... ,,	6d.	—
a Shellac ... ... per cwt.	£4 18s.	—
a Sulphur Commercial... ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3½d. to 3¾d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... .. per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil... ... ... ,,	1/2 to 2/9	—
p Babbitts Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£209	£2 inc.
Grade II ... ... ,,	£143	£1 inc.
Grade III... ... ... ,,	£73	£1 inc.
c Brass (rolled metal 2" to 12" basis) per lb.	6¼d.	¼d. dec.
c ,, Tubes (solid drawn) ... ... ,,	9d. to 9¼d.	¼d. dec.
c ,, Wire, basis ... ... ,,	7¼d.	¼d. dec.
c Copper Tubes (solid drawn) ... ,,	9¼d.	¼d. dec.
g ,, Bars (best selected)... ... per ton	£60	£2 dec.
g ,, Sheet... ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£33	£2 dec.
d ,, ,, Wire Rods ... ,,	£40	10s. dec.
d ,, ,, H.C. Wire ... per lb.	6¼d.	¼d. dec.
f Ebonite Rod ... ... ,,	1/6 to 2/- plus	—
f ,, Sheet ... ... ,,	1/3 to 1/6 10%	—
n German Silver Wire ... ... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para-fine ... ... ,,	5d.	—
i Iron, Pig. (Cleveland No. 3) ... per ton	62/6	—
i ,, Wire galv. No. 1, P.O. Qual.... ,,	£20	—
g Lead, English Pig ... ... ,,	£15 15s.	5s. inc.
g Mercury ... ... per bot.	£11/7/6 to £11/17/6	—
e Mica (in original cases) small ... per lb.	6d. to 1/-	—
e ,, ,, medium ... ,,	5/- to 10/-	—
e ,, ,, large ... ,,	10/6 to 17/6 up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	11¼d.	—
p ,, ,, rolled strip & sheet ,,	10¾d.	—
p ,, ,, wire ... ... ,,	11¼d.	—
o Platinum ... ... per oz.	£7	—
d Silicium Bronze Wire ... ... per lb.	7¼d.	¼d. dec.
r Steel, magnet, in bars ... ... ,,	7¾d.	—
g Tin, Block (English)... ... ... per ton	£229	£1 inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	—

Quotations supplied by:—

a G. Boor & Co.	g Henry Gardner & Co., Ltd.
b The British Aluminium Co., Ltd.	h Edward Till & Co.
c Thos. Bolton & Sons, Ltd.	i Bolling & Lowe.
d Frederick Smith & Co.	n P. Ormiston & Sons.
e F. Wiggins & Sons.	o Johnson Matthey & Co.
f India Rubber, Gutta Percha, and Telegraph Works Co., Ltd.	p C. Clifford & Sons, Ltd.
	r W. F. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicum bronze wire, lead and rubber, up to the time of going to press, are given in our "Business Notes" under the same heading.

Trade Announcements

Santon, Ltd., has opened showrooms and offices at 24, Fountain Street, Manchester. The showrooms are equipped with a complete range of the company's products, and the branch is in charge of Mr. J. F. Ford, who has been appointed the company's Northern area branch manager.

The E.C.A. Presidential Badge

Contractor delegates to the recent National Electrical Convention probably noticed that their president (Mr. H. Marryat) was wearing a much neater badge than usual. It was produced under Mr. Marryat's direction by Messrs. S. Olin, of Hatton Garden, and, as our illustration shows, reproduces the Association's initials in platinum-set diamonds. These are surrounded by a "Faraday ring" in gold and platinum and round the whole is a gold laurel wreath. The Association's motto appears at the bottom in gold enamel.

The new E.C.A. presidential badge

New Catalogues and Lists

Cochranes (Middlesbro') Foundry, Ltd., Ormesby Iron Works, Middlesbrough.—A stock list of British Standard specials.

Benjamin Electric, Ltd., Brantwood Works, Tariff Road, Tottenham, N.17, has issued a complete catalogue of water heaters and a booklet published in connection with the National Electrical Convention.

M. & C. Switchgear, Ltd., Kelvinside Works, Kirkintilloch, Glasgow.—A leaflet on type 282 a.c. push-button starters for slip-ring motors.

United Electrical Co. (Coolex), Ltd., Chester Street, Birmingham, 6.—A complete catalogue of "Coolex" switch and fuse gear.

Constructors, Ltd., Nickel Works, Tyburn Road, Erdington, Birmingham, have sent a pamphlet on constructors' steel equipment.

Schall & Son, Ltd., 75, New Cavendish Street, W.1, have published a booklet on the "Pantostat" for cautery, light, galvanic, faradic and sinusoidal treatment.

Siemens-Schuckert (Great Britain), Ltd., 30, New Bridge Street, E.C.4.—Details of a new motor-driven gong.

Leslie Dixon & Co., 218, Upper Thames Street, E.C.4.—A leaflet on slider dimming resistances.

British Insulated Cables, Ltd., Prescot, have issued a booklet giving particulars of wire for electrical purposes, and a leaflet on h.v. condensers.

Aidas Electric, Ltd., Sadia Works, Park Avenue, North Circular Road, N.W.10.—Particulars of the "Sadia" nonscale water heaters.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.—A new window bill and descriptive folder on the "Battery S.G.3."

W. C. Davey & Co., 176, Tottenham Court Road, W.1.—Publication No. 110 illustrating two new designs of telephones.

Bolling & Lee, Ltd., Cambridge Arterial Road, Enfield.—Leaflets on a flex lead interference suppressor and a "set lead suppressor."

Knightshades, Ltd., 36, Queensway, Ponders End, have issued a 28-page coloured catalogue of shades, table and standard lamps.

H. Ashton, Bull's Head Passage, Market Place, Manchester.—A leaflet on an air purifier and deodoriser.

B.E.N. Patents, Ltd., Gorst Road, Park Royal, N.W.10.—Particulars of a new spray gun giving round and fan sprays.

Ward & Goldstone, Ltd., Frederick Road, Pendleton, have issued details of the "Telestat" down lead for noise-free short- and broadcast-wave aerial systems.

Hackbridge Electric Construction Co., Ltd., Hersham, Walton-on-Thames.—A leaflet describing portable precision multi-range current transformers.

London Electric Wire Company and Smiths, Ltd., Playhouse Yard, Golden Lane, E.C.1, have issued a new publication on "Lewcos" enamel and single paper-covered wires.

Herodrome, Ltd., 74, Victoria Street, S.W.1.—Details of the Loveridge boundary beacon for aerodrome lighting.

Rheostatic Co., Ltd., Slough.—A new publication describing the wide range of "Satchwell" thermostats.

Carron Company, Carron, Falkirk.—A new catalogue devoted to heavy cooking apparatus.

Turbine Gears, Ltd., Cheadle Heath, Stockport.—A booklet on gears and gear units.

Premier Electric Heaters, Ltd., Keeley Street, Birmingham, has issued new leaflets on kettles, irons, toasters and coffee percolators.

Higgs Motors, Ltd., Witton, Birmingham, 6.—A number of new catalogue sections relating to electric motors, geared units and small battery charging sets.

Bulpitt & Sons, Ltd., Swansea Works, Birmingham, have issued a new electrical catalogue giving many price reductions and particulars of a number of new lines.

Ray Engineering Co., Ltd., Waterdale Works, Southmead, Bristol.—Details of the company's apparatus for battery charging.

Bankruptcy Proceedings

A. Harrison, 110, Town Street, Horsforth, near Leeds, lately 9, Stanmore Crescent, Burley, Leeds, electrical engineer and contractor.—When the public examination herein was held recently at the County Court House, Albion Place, Leeds, debtor said he commenced business on his own account as an electrical and radio engineer and contractor at his private address at Stanmore Crescent with a capital of £20. In January, 1934, he obtained a tenancy of the premises at Town Street, Horsforth, and commenced trading there in the following month. The takings gradually declined until they were insufficient to cover overhead expenses. The failure was attributed to lack of capital, keen competition and bad debts. The examination was adjourned for closing. The statement of affairs showed a deficiency of £113.

J. C. De Wardt, trading as "De Wardt Radio," 10, Windmill Street, Gravesend, Kent, radio and electrical engineer.—The public examination herein was concluded at the Court House, Eastgate, Rochester, recently. According to the statement of affairs returned by debtor there were liabilities of £1,977, assets of £352, and a deficiency of £1,625.

H. A. Langlois (Electrical Installation Co., and/or Electrical Contracting Co., 2, Atlas Place, Cardiff, and Leicester), electrical contractor.—Trustee, Mr. L. S. Findlay, 35, Windsor Place, Cardiff, released March 27th.

T. McKnight, electrical contractor and wireless dealer, 9, Tootal Road, Weaste.—First and final dividend of 3⅗d. in the £1, payable July 12th at the Official Receiver's Office, Byrom Street, Manchester.

F. E. V. Hooper, electrical engineer, 26, Moorgate Avenue, Crookesmoor, Sheffield.—Receiving order made June 21st on debtor's own petition.

R. C. V. Radeglia, electric lamp dealer, 40, King William Street, E.C.—Application for discharge to be heard on July 16th at Bankruptcy Buildings, Carey Street, W.C.

J. F. Creasey (Positive Electric Co.), 673, Romford Road, Manor Park, E.1, 6a, The Parade, Wanstead Park, and 92, Katherine Road, East Ham.—Trustee, Mr. O. D. Manwaring, 50, Cannon Street, E.C., released May 8th.

T. Hughes-Davies, wireless engineer, Radio House, High Street, Llangefni.—Trustee, Mr. A. Cripwell, 12, Cherry Street, Birmingham, released April 30th.

R. Phœnix (Monarch Radio Service), 28, Tramway Street, Leeds.—Trustee, Mr. H. C. Bowling, 24, Bond Street, Leeds, Official Receiver, released April 18th.

C. E. Moore (C. E. Moore & Co.), wireless engineer, 35, High Street, St. Neots.—Trustee, Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C., released May 8th.

J. C. Law, electrical and radio engineer, Alma Villa, Mark, Somerset.—Trustee, Mr. H. Wheeler, 26, Baldwin Street, Bristol, Official Receiver, released June 11th.

W. M. Horsfall, electrical engineer, 7, Redcross Street, Liverpool.—Eleventh and final dividend of 4¾d. in the £, payable June 28th at the Official Receiver's offices, Government Buildings, Victoria Street, Liverpool.

W. A. Beaumont, electrical engineer, 44, Warrengate, Wakefield.—Third supplementary dividend of 1s. 6¾d. in the £, payable June 25th at 13, Burton Street, Wakefield.

Private Arrangements

T. Storry, radio dealer, &c., 57, London Street, Southport.—At the meeting of creditors of the above held recently at Southport the statement of affairs showed liabilities of £600. There were also contingent claims for £434 which arose in respect of the unexpired portion of the lease of the premises and the liability under guarantees in connection with hire-purchase transactions. No portion of those amounts, however, was expected to rank. After allowing £30 for preferential claims the net assets were £173, leaving a deficiency of £427. It was stated that the debtor commenced trading on his own account in September, 1933, with a cash capital of £138. During the six months to March, 1934, the turnover was £997, and in the following year it amounted to £1,576. Since March 31st of the present year the turnover had been about £200. During the initial period of the trading there was a loss of £40, and in the following year a loss of £171, while since March the loss has been £37. An offer was made of a composition of 5s. in the £, which it was decided should be accepted.

Company Liquidations

British Lumophon, Ltd., Stahl House, Judd Street, King's Cross, W.C.—The first meetings of creditors and shareholders under the compulsory liquidation of this company were held on June 25th at Carey Street, W.C. A statement of affairs was presented showing total liabilities of £16,866, including unsecured debts £5,275 and debenture claims £11,561. The assets, valued at £10,170, are wholly absorbed in the debenture claims. Mr. Ormrod, Assistant Official Receiver, reported that the company was formed as a private company in December, 1930, to carry on business as manufacturers of and retailers of wireless telegraph and telephone apparatus. It secured the sole selling rights for Great Britain in the "Lumophon" receiving sets manufactured in Germany. The company had no sales organisation of its own, but the Chorlton Metal Co., Ltd., and the Electric Lamp Service Co., Ltd., acted as its selling organisations in the northern and southern territories respectively. The marketing of the receivers was very successful from the outset and in September, 1931, £3,000 was distributed as a net interim dividend on the £1,000 issued capital. The failure of the company was attributed (1) to losses incurred through taking back unsaleable old-type sets from customers at full invoiced prices, and inability to convert old-type sets into profitable and marketable goods; (2) to uncertainty of litigation commenced against the company by royalty owners; (3) loss resulting from depreciation of sterling; (4) to the boycott of German goods which prematurely terminated the company's business in a new type of set; and (5) to bad debts sustained on trading and in connection with hire-purchase transactions. The liquidation was left in the hands of the Official Receiver.

Warwickshire Electric Refrigerator Co., Ltd., 239, Broad Street, Birmingham.—The statutory meeting of creditors of the above was held in London on June 26th, when a statement of affairs was submitted which showed liabilities of £4,986, of which £2,927 was due to the trade, and the directors were creditors in respect of loans amounting to £2,059. In addition there were contingent liabilities in respect of neon signs amounting to £71 and contingent liabilities as regarded subdealers of £146. The net assets were £1,792, with a deficiency, so far as the creditors were concerned, of £3,194. The nominal capital of the company was £3,000, of which £502 had been issued, so that the total deficiency, as regarded contributories, was £3,696. It was stated that the trading had not been successful, and for the year to December, 1933, there was a loss of £303, and in the following year there was a loss of £406. From March, 1934, to March, 1935, the loss on the trading amounted to £1,190. A resolution was passed appointing Mr. H. Summers, of Northampton, as liquidator of the company with a committee of inspection consisting of the representatives of the International Refrigerator Co., the Smithfield Refrigerator Co., and Messrs. Jackson & Podgett.

Wallasey Electrical Equipment Co., Ltd.—Winding up voluntarily. Liquidator, Mr. P. S. Booth, 35, Exchange Chambers, 2, Bixteth Street, Liverpool.

Radiovisor Foreign & Colonial, Ltd.—Meeting August 8th at the Institute of Chartered Accountants, Moorgate Place, E.C., to receive an account of the winding-up by the liquidator, Mr. W. H. Peat.

Britannia Electric Lamp Works, Ltd.—Meeting July 29th at 14, Sunbeam Road, Park Royal N.W.10, to receive an account of the winding-up by the liquidator, Mr. J. Matson.

Ceylon's Electrical Imports

THE following table, based on the official foreign trade returns of Ceylon, shows the imports of electrical goods and machinery in 1934, with the principal countries of origin and a note of increases or decreases compared with 1933. It will be seen that increases are shown in the totals of all groups with the exception of unspecified machinery and transformers, and that as a whole the share of the United Kingdom has been well maintained. The aggregate value of the imports of electrical goods and apparatus last year was Rs.1,428,000 as compared with Rs.849,000 in 1934—an advance of over 60 per cent. during the year.

(The par value of the rupee is 1s. 6d.)

	1934. Rs. (Thous.)	Inc. or dec. Rs. (Thous.)
Control and switchgear—		
Total*	39	+ 8
Radio instruments and apparatus—		
Total	142	+ 35
From United Kingdom	95	+ 15
„ Germany	6	— 8
„ Holland	14	+ 5
„ United States	21	+ 20
Other telegraph and telephone instruments—		
Total*	41	+ 14
Lighting accessories, fittings and switches—		
Total	283	+ 58
From United Kingdom	71	— 35
„ Germany	21	+ 5
„ Japan	17	— 2
„ United States	45	+ 2
Batteries, dry—		
Total	270	+ 101
From United Kingdom	18	— 1
„ United States	133	+ 20
„ Germany	5	+ 1
Other batteries and accumulators—		
Total*	58	+ 38
Elec. goods and apparatus not elsewhere specified—		
Total	287	+ 113
From United Kingdom	246	+ 95
„ Germany	18	+ 11
„ Japan	7	+ 3
„ United States	7	+ 4
Transformers and convertors—		
Total*	13	— 1
Generators and alternators—		
Total*	69	+ 41
Motors—		
Total	72	+ 22
From United Kingdom	64	+ 14
„ United States	1	+ 1
„ Sweden	5	+ 5
Elec. machinery not elsewhere specified—		
Total	106	— 68
From United Kingdom	89	— 62
„ Germany	4	— 3
„ Italy	2	+ 2
„ United States	4	+ 1
„ Sweden	7	+ 7
Rubber insulated wires and cables—		
Total	149	+ 58
From United Kingdom	127	+ 53
„ Germany	14	+ 7
Other elec. wires and cables—		
Total	75	+ 58
From United Kingdom	69	+ 53
„ Germany	4	+ 4
Lamps, gasfilled—		
Total	50	†
From United Kingdom	44	—
Elec. lamps, other—		
Total	27	—
From United Kingdom	19	—
„ Japan	2	—
Torch bulbs—		
Total	45	—
From Japan	13	—
„ United States	31	—

* Mainly from United Kingdom.
† Total of all elec. lamps in 1933, Rs. 19,000.

Electricity Supply

Lighting, Domestic, Power

Annfield Plain (Co. Durham).—CONCESSIONS.—The Urban District Council has decided to allow increased discounts for prompt payment of electricity bills. Reductions in charges are also being made in the power, heating and cooking tariffs.

Axminster.—STREET LIGHTING.—The South Somerset Electricity Co. has offered the Urban District Council reduced terms for street lighting if a three years' agreement is signed, and a further reduction for six years.

Batley.—MUNICIPAL TRADING RESULTS.—In spite of the loss of its largest consumer (the Tramway Company) the Electricity Department sold 720,373 more kWh during 1934-35 than during the previous year, while the sales of the Gas Department fell away by 2,876,200 cu. ft.

Bideford.—PROPOSED SUPPLY AREA EXTENSION.—The Bideford and District Electric Co., Ltd., has applied for a Special Order to extend its area of supply to include Arlington, Ashford, Bratton Fleming, Braunton, Challacombe, East Down, Goodleigh, Heanton Punchardon, High Bray, Kentisbury, Loxhore, Martinhoe, Marwood, Parracombe, Shirwell, Stoke Rivers, Trentishoe and West Pilton in the rural district of Barnstaple, and to empower the company to purchase the Braunton Electric Light & Power Co., Ltd.

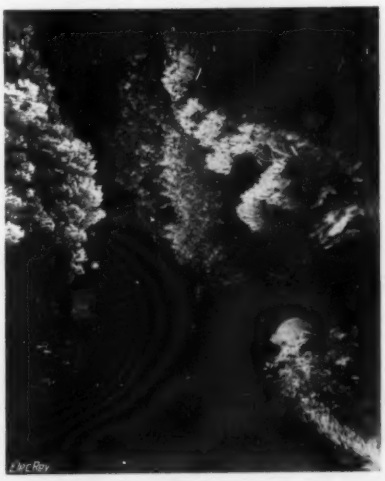
Blackburn.—LOANS.—The Finance Committee has approved a recommendation of the Electricity Committee to borrow £30,000 for capital expenditure on erecting and equipping sub-stations, and £50,000 for mains and services.

Blackpool.—ALLOCATION OF SURPLUS.—There was a surplus of £37,410 on the working of the Electricity Department during 1934-35 which, with a balance of £8,000 from the previous year, made a total of £45,410. The Committee has decided to dispose of this sum as follows:—£12,102 to the relief of the rates; £214 to reserve fund; £10,094 to special expenditure; £15,000 to the development fund; £5,000 to new transformer houses and equipment; and £3,000 to replacing transformer equipment.

LOAN FOR EXTENSIONS.—Application is being made by the Electricity Committee for sanction to borrow £115,000 for mains extensions throughout the area of supply on account of the abnormal demand. This sum, it is anticipated, will be sufficient for three years.

NEW EQUIPMENT.—A new sub-station is being built in the Leeds Road district of Blackpool and old cables are being replaced.

Birmingham.—SHIRLEY HOSPITAL CARNIVAL.—For the Hospital Carnival Week at Shirley (June 24th to 29th) the Birmingham Electricity Supply Department floodlighted the war memorial (in red) and the avenue of trees behind it. Holophane equipment was used.



A verdant avenue floodlighted for the Shirley Hospital Carnival

Cambridge.—STREET LIGHTING DEBATE.—The Council last week considered a recommendation of the Public Works and Town Planning Committee that gas should be used for improved street lighting of the borough. After a debate for over an hour and a quarter regarding the merits of gas and electricity the Council decided to refer the matter back for further consideration.

Cardiff.—FLOODLIGHTING.—The Electricity Committee is contemplating arranging for the permanent floodlighting of public buildings.

Clayton.—STREET LIGHTING.—The Parish Council is to invite tenders for public lighting.

Ealing.—SALE OF REFRIGERATORS.—A recommendation of the Electricity Committee provides for refrigerators being sold on the hire-purchase system.

MAINS AND SUB-STATION EQUIPMENT.—It is proposed to extend cables and sub-station equipment at a cost of £5,250 to meet demands in the Park Royal area.

Eastry.—RURAL DEVELOPMENTS.—A committee has been appointed to consider a scheme submitted by the South-East Kent Electric Power Co. for street lighting throughout the rural area. It is anticipated that a supply will shortly be available at Ash, Wingham, St. Nicholas-at-Wade, and Monkton, while the provision of a supply in the near future at Woodnesborough, Acol and Sarre is under consideration.

Fife.—CHEAPER ELECTRICITY.—A scheme to lower the price of electricity has been adopted by the Fife Electric Power Co. There will be a fixed charge per room, plus ¾d. per kWh.

Finchley.—LIGHTING IN NEW ROADS.—Street lighting is to be provided in new roads at a cost of £3,568.

METER RENTALS.—The Council has agreed to meter rentals being abolished, except in the case of meters for subsidiary purposes.

LOANS.—The Electricity Committee is to borrow £7,250 for mains, £4,849 for sub-station equipment and £1,455 for a sub-station site at Hampstead Garden suburb.

Gainsborough.—SALES WELL UP.—Mr. H. Breckell, engineer and manager, informs us that the sales of the Electricity Department during 1934-35 amounted to 3,639,074 kWh as compared with 2,792,039 during the previous year, representing an increase of 30 per cent. The number of consumers also rose by 30 per cent. to 2,188. Further progress is likely as the Council introduced substantial reductions in tariffs as from April 1st last. Application is to be made for sanction to borrow £6,300 for the further development of the assisted wiring scheme.

Glasgow.—SUPPLY AGREEMENTS.—The Health Committee has approved the terms of a proposed agreement between the Corporation and the Clyde Valley Electrical Power Co. with regard to a supply of electricity for heating and lighting the extensions to Hawkhead mental hospital. The Public Assistance Committee has consented to an agreement being entered into with the same company for a supply of electricity to the Lennox Castle Institution for a period of seven years at the following rates: First 150,000 kWh per annum, 1d. per kWh; next 150,000, 0.85d.; next 150,000, 0.7d.; all in excess, 0.5d. per kWh.

MAINS.—Distributing mains are to be laid at a cost of £12,013.

Great Britain.—DAMAGE BY LIGHTNING.—Violent thunderstorms last week caused damage to supply lines in many parts of the country. Four grid lines between Northampton and Kettering and Corby were struck, together with overhead lines to the surrounding villages, which were without electricity for the evening. Some of the village supplies were restored by dark, but that to Kelmarsh and Clipstone, where insulators were shattered and lines brought to the ground, was not restored until the following day. At Nelson (Glamorgan) the electricity supply was not restored for fifty-two hours.

Liverpool.—INQUIRY.—Arrangements have been made for the Electricity Commissioners to hold an inquiry on Thursday, July 4th, into the proposal of the Corporation to acquire the Prescot electricity undertaking of British Insulated Cables, Ltd. One or two members of the City Council have opposed the scheme on financial grounds.

London.—HACKNEY.—The Electricity Committee is seeking sanction to borrow £30,000 for consumers' wiring, £60,000 for mains and £50,000 for meters and demand indicators.

POPLAR.—It is reported by the Electricity Committee that consumption has increased since the power rate was reduced last July, in consequence of which a further reduction is recommended. The proposed new tariffs are on a sliding scale, with a rate commencing at 1½d. per kWh for 500 kWh a month down to 1d. per kWh for over 10,000 kWh per month.

The Electricity Committee proposes to abolish the 238 current limiters in Council houses and flats because they are unstable and enable malpractices to occur, and to replace them by 5-A slot meters.

FULHAM.—Following a further report by the borough electrical engineer the Housing Committee has decided to provide an electric drying shed at Fulham Court at a cost of £861. It was stated that the running costs with electricity would be more than with gas, but the borough surveyor expressed himself in favour of electricity.

STEPNEY.—In consequence of complaints regarding alleged grit emission from its Limehouse generating station (as recently reported in the ELECTRICAL REVIEW) the Council has decided to erect a new brick chimney stack at a cost of £16,151.

Longbenton (Northumberland).—SUPPLY OFFER REJECTED.—The Urban District Council has rejected an offer by the North-Eastern Electric Supply Co., Ltd., to install electricity in Council houses at Annitsford.

Maidenhead.—LOWER CHARGES.—As from the end of the June quarter the Town Council is reducing the "unit" charge under the two-part tariffs on rental accounts within the borough from 0.875d. to 0.75d. In the case of prepayment meters the rebate is raised from 2d. to 3d. in the shilling, the "unit" charge remaining at 1½d.

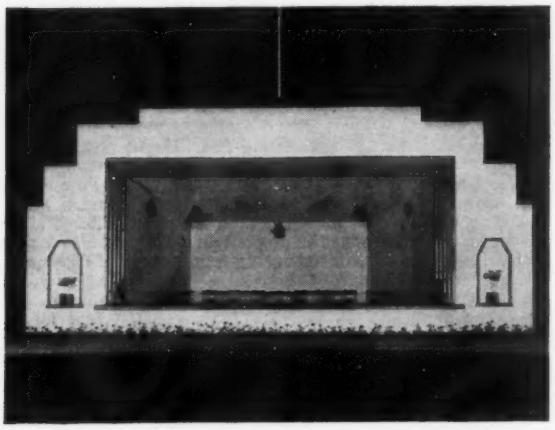
Merioneth.—COASTAL ELECTRIFICATION COMPLETED.—The supply of electricity to Towyn and Aberdovey was inaugurated last week. This completes the North and Mid-Wales coastal electrification scheme.

Manchester.—WIDESPREAD USE OF ELECTRICITY.—In a report on smokeless fuels presented to the City Council it is mentioned that, at present, out of approximately 200,000 houses in the Manchester electricity supply area 80,000 make use of electricity, and of this number about 30,000 have installed

apparatus for cooking, heating and other domestic purposes, displacing in most cases fireplaces burning coal. Connections include 40,000 radiators, 14,000 cookers, 1,500 water heaters and 1,600 wash-boilers. In 1933 nearly 85 per cent. of the power used by industry in Manchester, amounting to nearly 270,000 h.p., was supplied in the form of purchased electricity.

Oswestry.—SUPPLY TO ST. MARTIN'S.—The Rural District Council has decided to offer no objection to the erection of an overhead line by the Electricity Distribution of North Wales & District, Ltd., to supply electricity to St. Martin's.

New Zealand.—HUTT VALLEY BOARD'S REPORT.—Statistics contained in the 1934-35 report of Mr. E. F. Hollands, M.I.E.E., engineer and general manager to the Hutt Valley Electric Power Board, show that the number of consumers increased during the year by 335 to 11,779. The energy sold,



The bandstand recently opened at Hollycroft Park, Hinckley, and effectively floodlighted by B.T.H. type "B" floodlight projectors fitted with 400-W "Mazda Mercra" lamps

however, decreased by 114,803 to 19,276,000 kWh and the amount purchased by 118,250 to 22,367,500 kWh. Net revenue amounted to £94,774, a decrease of £2,216, an additional £2,316 having been allowed in discounts. Income from power was less, while that from heating and cooking rose appreciably. The total working expenses were £65,914 (£64,016 last year). After providing for sinking fund and other charges there is left a net balance of £4,237, of which £2,000 is to be used to write down "management and general" and £2,237 is to be carried forward.

Portland.—TARIFF REDUCTIONS.—The Urban District Council has made the following reductions in charges: Lighting flat rate, from 8d. to 7d. per kWh; slot meters, from 10d. to 9d. per kWh; heating and power, from 3½d. to 2½d. per kWh for the first 100 kWh per quarter, from 2½d. to 2d. for the next 400, and from 2d. to 1½d. beyond; size of house tariff, a general reduction of 5s. per annum in the scale of fixed charges and a reduction in the "unit" charge from 1d. to ¾d.; size of house slot supplies, "unit" charge reduced from 1d. to ¾d.; rateable value tariff, from 2d. to 1½d. per kWh; h.p. tariff, first 75 kWh per quarter per h.p. installed reduced from 3d. to 2½d. per kWh; hotel tariff, reduced to ¾d. per kWh; Borstal institution, maximum demand charge reduced from £5 per kVA to £3 10s., and the "unit" charge reduced by 0.25d.; cooker rents, reduction of 1s. per quarter.

Rushden.—OVERHEAD LINES.—The Urban District Council has consented to the erection by the Rushden & District Electric Supply Co., Ltd., of an overhead h.v. line north of Kimbolton Road.

Shanklin (I.o.W.).—FLOODLIGHTING.—The Urban District Council has arranged to floodlight Rylstone Gardens and Tower Cottage Gardens.

Stalybridge.—GRANTS BY JOINT BOARD.—The Stalybridge, Hyde, Mossley and Dukinfield Tramways and Electricity Board has decided to make a grant of £1,000 to each of its constituent authorities out of its profits during 1934-35.

Stoke-on-Trent.—TRANSFORMER CAPACITY.—Steps are being taken to increase the transformer capacity in four sub-stations at a cost of £1,650.

ALTERNATIVE SUPPLY.—An alternative supply is to be afforded in the Selwyn Street area at a cost of £2,100.

COUNCIL HOUSE INSTALLATIONS.—The Electricity Committee suggests that all new Council houses shall be wired for electricity both for lighting and heating purposes, and that existing houses shall be wired if the tenants make application for an electricity supply.

REDUCTIONS IN CHARGES.—A lower scale of charges is to become operative as from the meter readings at the beginning of the September quarter. In the two-part tariff the "unit" charge will be uniformly ¾d. instead of 1d. per kWh for the first 240 kWh and ½d. thereafter; the lighting flat rate will be reduced from 4d. to 3½d. per kWh; commercial and industrial long-hour lighting from 8d. to 7d. per kWh for the first hour's use per day of the maximum demand; and the prepayment tariff from 5d. to 4½d. per kWh (assisted wiring 6½d. to 6d.). There are also reductions for churches, theatres, cinemas, contractors' showrooms, and motive power.

Sunderland.—ROKER PARK ILLUMINATIONS.—At an estimated cost of £5,000 a scheme of illuminations and other attractions is to be staged at Roker Park.

Wick.—MANAGER'S REPORT CORROBORATED.—Recently Mr. J. N. Atkinson, manager of Wick municipal electricity undertaking, reported unfavourably on the financial position and gave figures showing an accumulated deficit of £4,290. The manager's report was criticised, and it was contended there was an accumulated trading profit. An expert from the Electricity Commissioners now reports on somewhat similar lines to Mr. Atkinson, putting the loss on the undertaking since its inception as £4,141.

Wellingborough.—CONTRACT CANCELLED.—Tenants of 306 houses now in course of erection on the Urban District Council's Doddington Road estate are not to have electricity installed as previously planned. The Council's refusal to permit overhead cables has resulted in a breakdown in the negotiations with the supply company and the cancellation of a £1,000 contract for installation work. The Council claims that the tender was distinctly based on underground mains. The Wellingborough Electric Supply Co., Ltd., states that the offer made to supply these houses provided for underground mains wherever roads existed, and that in order to feed the mains on the estate a temporary consent to the erection of a short length of overhead main over open fields was asked for, the company undertaking to place this underground as soon as the land should be developed.

York.—LOANS.—The Electricity Committee has obtained sanction to borrow £10,767 for mains and £5,915 for sub-station equipment.

Proposed Amendments to Supply Regulations

AT a conference of twelve Joint Electricity Authorities, Joint Advisory Boards and Joint Committees held on June 27th and 28th at Llandudno, the Electricity Supply Regulations, 1934, were discussed. It was stated that the Electricity Commissioners did not intend to apply Regulation 1 (requiring the resistance of insulation of l.v. and m.v. circuits of undertakings to be tested before use) to small extensions.

It was suggested that "five ohms" should be substituted for "one ohm" as the value of the resistance permitted under Regulation 4 (d) to be connected in parallel with the fuse or circuit-breaker earthing the mid-wire of a d.c. three-wire system.

Regulation 28, which prevents the giving of a l.v. supply from more than one pair of conductors of a three-wire or multiphase m.v. system unless the kW installed exceeds 15 was generally regarded as unnecessary. If it be retained, it was held that the limit should be between 7 and 10 kW.

The Commissioners have had under consideration the strengthening of the wording of Regulation No. 31 by *prohibiting* an undertaking from commencing or continuing to give a supply for a luminous-tube sign outside a premises (even though the premises come under the jurisdiction of the Home Office or the Mines Department) if it does not comply with the safety standards specified. At present an undertaking is not *compelled* to give a supply in such a case. This amendment was opposed by the supply representative who held that it was primarily the duty of the consumer to ensure that his apparatus conformed with the regulations. Any further protection, it was held, could more appropriately be obtained through local bylaws relating to the construction of the apparatus.

The increased range of permissible voltage variations to ± 6 per cent. was considered of material advantage in rural areas and it was preferred that the margin allowed under Regulation 34 should remain unaltered for two or three years in this respect rather than be changed to + 8 per cent. and − 4 per cent. as tentatively proposed by the Commissioners. The Commissioners stated that the tolerance in the declared frequency would be reduced from 2½ to 1 per cent. It was agreed that Regulation 38 requiring notice of accidents to be sent to the Commissioners might reasonably be extended to include failures of supply where the number of consumers or kilowatts affected or the duration of the trouble was of sufficient importance.

The chairman of the conference, Mr. G. R. J. Parkinson, in a speech at the dinner on June 27th outlined the circumstances that led up to the formation of the Joint Electricity Authorities. He said that the local authority undertakings and his own company (Midland Electric Corporation for Power Distribution, Ltd.), in the area of the West Midlands J.E.A. had definitely benefited by selling their power stations and purchasing electricity from the authority.

Traction

Australia.—MELBOURNE TRAMWAYS.—Another attempt is being made to relieve the Melbourne Tramways Board of its statutory payments to consolidated revenue. In the year 1933-34 the Board paid £112,000 to consolidated revenue and showed a deficit of £63,208, and since its inception a total of £1,535,395 has been paid. The payments are made on account of the Fire Brigades Board, the Licences Equivalent Fund, and the Infectious Diseases Hospital.

Germany.—A DIESEL-ELECTRIC EXPRESS.—A new express Diesel-electric train service was brought into operation on Monday between Cologne and Berlin. It accomplished this journey at an average speed of 70 m.p.h., including five stops.

Glasgow.—SUGGESTED RAILWAY ELECTRIFICATION.—A sub-committee of the City Council has been appointed with a view to representations being made to the Government for a subsidy or a guaranteed loan to finance a scheme for the electrification of suburban lines.

Irish Free State.—ACCIDENT TO BATTERY TRAIN.—It is reported that one of the two trains equipped with Drumm batteries skidded on the wet rails last week and was wrecked.

South Africa.—JOHANNESBURG ROLLING STOCK TENDERS.—Tenders for contracts involving an expenditure of more than £300,000 on the Johannesburg municipal transport system have been opened, but have not yet been decided upon. The tenders were for the supply of twenty-two trolley-buses and fifty light-weight tram-cars. There were eight tenders for the trolley-buses and seven for the tram-cars. Tenderers quoted separately for the chassis and bodies of the trolley-buses, the prices for the chassis ranging from £1,000 up to £1,800.

Woking.—The Southern Railway is to rebuild the station at a cost of nearly £200,000. It was recently announced that the company contemplates an electrification scheme in order to run through electric trains from London to Woking.

Communications

Chertsey.—AUTOMATIC TELEPHONE EXCHANGE.—A new automatic telephone exchange has been brought into use at Chertsey. There are three hundred subscribers and the exchange will serve an area of approximately eight square miles.

China.—NEW TELEPHONE SERVICE.—The recently installed telephone line between Nanking and Tushanchen has been inaugurated by the Nanking Telephone Bureau.

Germany.—MICRO-WAVE EXPERIMENTS.—Last week representatives of the German Wireless Society carried out experimental transmissions on wavelengths of between one-tenth metre and one metre at Gross Ziethen, near Berlin. The directional properties of these micro-waves have proved to be very pronounced.

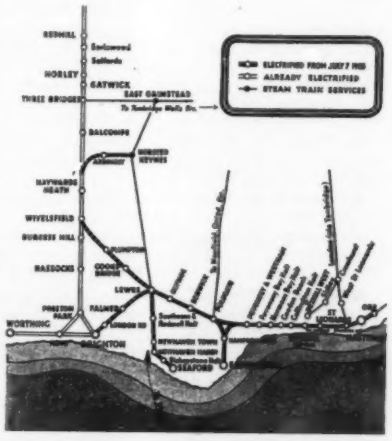
Great Britain.—ULTRA-SHORT WAVE TRANSMISSIONS.—The experimental transmissions on a wave-length of five metres from the summit of Snowdon, referred to in last week's issue, proved very successful, the signals being picked up to Stoke Poges (180 miles distant), Bristol (120 miles) and at Ormskirk, Lancs (50 miles).

ADDITIONAL TELEPHONE CHANNEL TO SOUTH AFRICA.—As a consequence of the popularity of the wireless telephone service between South Africa and Great Britain it has been decided to increase the existing facilities in South Africa by the provision of a new high-power short-wave telephone transmitter of the Marconi S.W.B.9 type, which will be installed at Klipheuvol. The receiving station at Milnerton will also be enlarged to cope with the new traffic, and the new "international" type of Marconi receiving equipment, with invertor gear for secrecy of communication, is being added to the installations already in use.

Wales.—BROADCASTING STATION.—It is reported that a broadcasting station is to be erected at Beaumaris, Anglesey, to serve North Wales.

The Southern Main Line Electrification Extended

BY the extension of electric traction on its main lines from Keymer Junction to Lewes, Newhaven, Seaford, Eastbourne, Bexhill, Hastings, and Ore (see pictures on p. 15), the Southern Railway Co. has increased the route mileage over which it operates electric trains by about fifty miles. The lines between Brighton and Lewes and between Horsted Keynes and Haywards Heath, have also been included in this extension. The total single track mileage now equipped for electric traction has been increased by over 129 miles, bringing the total electrified track miles of the Southern Railway to 1,156, the total route miles being 444.



Map showing the extension of Southern Railway's electrified system to Lewes, Newhaven, Seaford, Eastbourne, Bexhill, Hastings and Ore

Electricity is obtained from the grid, and feeding points have been established *via* the C.E.B.'s sub-stations at Eastbourne and Hastings. Supplies already established for the Brighton extension are also made use of. The energy is supplied at 33,000 V 50 cycles, and is distributed at this pressure to each of the sub-stations, where it is converted to 660 V d.c. for the conductor rails by a 2,500-kW mercury-arc rectifier.

Sixteen identical sub-stations and fourteen track paralleling huts have been erected, similar to those on the Brighton and Sevenoaks extensions. The whole of the electrical equipment in the sub-stations is arranged for remote operation by supervisory control, the positions of the circuit-breakers in the track paralleling huts being also indicated by the same system.

The Three Bridges control room, which was constructed for the Brighton and West Worthing sections, has been extended to control the new area as far as Eastbourne and Seaford. A new control house, has been erected at Ore for controlling the section between Polegate and Willingdon junctions and Ore. The rectifier d.c. circuit-breakers and those in the track paralleling huts are entirely automatic in action.

Groups of high speed circuit-breakers are installed in certain areas in small buildings at the side of the line, half-way between the sub-stations. These equipments are known as the track paralleling and are utilised to take advantage of all the cross-sectional area of the conductor rails.

Rolling Stock

For the local services two-car non-corridor units have been converted from steam stock bodies, but ten new two-car corridor units have been built for semi-fast services. The seventeen six-car corridor units for the fast services are formed of two all-steel corridor saloon-type motor cars between which are coupled two corridor third-class cars, one corridor first-class car and one corridor buffet car. The electric traction equipment is similar to that of the express stock in operation on the Brighton line. A hot-water service in the lavatory compartments is provided by electrically heated, thermostatically controlled storage-type water heaters.

The conversion scheme was prepared and carried out under the direction of Mr. Alfred Raworth, the company's electrical engineer for new works, Mr. George Ellson, chief engineer, being responsible for the civil engineering works. The rolling stock, apart from the electrical equipment, which has been Mr. Raworth's responsibility, has been produced by Mr. R. E. L. Maunsell, chief mechanical engineer.

The official opening of the newly electrified lines took place yesterday (Thursday).

The following carried out work in connection with the extension :—

Anti Attrition Metal Co., Ltd. (motor bearings); Asea Electric, Ltd. (33-kV switchgear, transformers, and supervisory equipment); Benjamin Electric, Ltd. (lighting fittings); Birmingham Railway Carriage & Wagon Co., Ltd. (motor coaches); British Insulated Cables, Ltd. (rail bonds); B.T.H. (train control equipments and high speed circuit-breakers); Bruce Peebles & Co., Ltd. (rectifier equipment); Chamberlain & Hookham, Ltd. (kWh meters); Chloride Electrical Storage Co., Ltd. (batteries); Doulton & Co., Ltd. (rail insulators); Edmundson's Electricity Corporation, Ltd. (lighting and power installation); Elliott Bros., Ltd. (indicating meters); English Electric Co., Ltd. (traction motors); Estler Bros., Ltd. (track switches, hydraulic compressors, &c.); W. T. Glover & Co., Ltd. (train equipment cables); Henley's (l.p. sub-station cables); Macintosh Cable Co., Ltd. (l.p. cables); Metropolitan Cammell Carriage Wagon & Finance Co., Ltd. (motor coaches); Metrovick (train control equipment); Parmiter, Hope & Sugden, Ltd. (auxiliary a.c. apparatus and enclosed type fuses); Pirelli-General (33-kV and pilot cables); Pritchett & Gold & E.P.S. Co., Ltd. ("Nife" emergency train-lighting batteries); Rosser & Russell, Ltd. (heating and ventilating equipment at Ore control room); Simplex Electric Co., Ltd. (conduit); Slydloks (l.v. fuses); W. M. Still & Co., Ltd. (coffee machines); Taylor, Tunnicliff & Co., Ltd. (rail insulators); Tok Switches, Ltd. (600-V switches); Westinghouse Brake & Signal Co., Ltd. (rectifiers for the remote control apparatus and brake equipment and compressors for rolling stock); G.E.C. (lighting equipment).

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Ashford.—July 8th. Electricity Department. Underground cables. (June 21st.)

Australia.—MELBOURNE.—Posts and Telegraphs Department. August 6th. Telephone switchboard cords. (A.Y. 13142.)* Telephone plugs and sleeves. (A.Y. 13141.)* Telephone instrument cords and cordage. (A.Y. 13143.)*

Belgium.—BRUSSELS.—July 15th. Commune de Saint Gilles-les-Bruxelles. Meters and armoured d.c. cable. Service d'Electricité, 40, Rue Fernand Bernier, St. Gilles (deposit 5 fr.).

Blackpool.—July 29th. Corporation. Stores. (See this issue.)

Bridlington.—July 8th. Town Council. Electricity for lighting and power in Sewerby House, including lamps and fittings. Borough architect, Town Hall.

Chesterfield.—July 11th. Town Council. Electrical equipment required for the purification and heating plant at the Stand Road open-air swimming bath, Whittington Moor. Borough engineer, 2, Gluman Gate (deposit £1 1s.).

Clitheroe.—July 15th. Electricity Department. P.i. cable. (June 28th.)
July 19th. Ten miles of copper conductor. (See this issue.)

Copenhagen.—August 13th. Lighting Department. Boiler plant, &c. (G.Y. 15280.)*

Croydon.—July 31st. Electricity Department. 30,000-kW turbo-alternator, complete with ancillary plant. (See this issue.)

Doncaster.—July 12th. Electrical installation in Edlington Council school. A. J. Dempster, divisional clerk, Winchester House, Scot Lane.

Dumfries.—July 9th. Electricity Department. H.p. and l.p. cables and two 150-kVA transformers. (June 28th.)
July 9th. County Council. Electrical work in connection with alterations at Glasgow Street school. J. Robson, County clerk, County Buildings.

Eastbourne.—July 11th. Electricity Department. Cable slabs. (June 28th.)

Easthampstead.—July 8th. R.D.C. Three vertical-spindle automatically controlled centrifugal crude sewage pumps with electric motors and accessories for the Brockhill Bridge sewage pumping station. W. E. Blizard, 25, Victoria Street, Westminster, S.W.1 (deposit £3 3s.).

Egypt.—August 15th. Mechanical and Electrical Department, Ministry of Public Works. Transmission line between the Bosseili and Rosetta pumping stations. Chief inspecting engineer, Egyptian Government, 41, Tothill Street, S.W.1. (deposit £1 0s. 6d. not returnable).
CAIRO.—July 25th. Ministry of the Interior. Electrical material required for the installation of underground and overhead distribution networks for Galioub. (A.Y. 13150.)*

Fife.—County Council. Electric lighting at the school-house, Leuchars, and the police station. Mr. Mitchell, County clerk. Cupar.

Finchley.—July 9th. Borough Council. Street fire alarm system. (June 21st.)

Gellygaer.—U.D.C. proposes to set up a register of contractors for electrical installation work. (June 28th.)

Glasgow.—Public Assistance Department. Grates and ranges and automatic board for Post Office telephone system at Lennox Mental Institution. (See this issue.)

Gloucester.—Electricity Department. Cookers, water heaters and street lamp standards. (June 28th.)

Halstead.—July 11th. R.D.C. Electrically driven borehole pump with accessories. S. E. C. Mercer, R.D.C. Offices, Colchester Road.

Hastings.—July 11th. Electricity Department. Electric goods lift. (June 28th.)

Horsham.—July 16th. U.D.C. Electric wiring in the Town Hall. C. G. Atkinson, Council's surveyor, Council Offices, Horsham Park (deposit £2 2s.).

Hull.—July 17th. City Engineer's Department. Electrically-driven pump. (See this issue.)

India.—SIMLA.—August 24th. Indian Stores Department. Supply of electric lamps required during the period from November 1st, 1935, to October 31st, 1936. (A.Y. 13124.)*

Inverness.—July 6th. Town Council. Electric lighting and power installation at the public baths, Glebe Street. A. F. Mackenzie, burgh surveyor, Town House.

Irish Free State.—ATHLONE.—July 16th. U.D.C. Electric motors and centrifugal pumps. P. H. McCarthy, 26, Lower Leeson Street, Dublin (deposit £3 3s.).

Lanark.—July 10th. County Council. Electrical work at housing estates. P. C. Smith, County housing and town planning engineer, 13, Clydesdale Street, Hamilton.

Leeds.—July 9th. Corporation. Electric lighting and provision of emergency lighting plant at the Victoria Hall, Town Hall. W. Towers, director of city buildings, Town Hall.

Lichfield.—July 8th. Town Council. Vehicle-actuated automatic electric traffic signals at road junctions. C. T. Read, The Guildhall.

London.—ST. PANCRAS.—July 11th. Electricity Department. P.i., l.c. cables and meter boards. (June 28th.)
COMMISSIONERS OF H.M. WORKS.—July 10th. Electrical accessories. (June 28th.)

BETHNAL GREEN.—July 16th. Borough Council. Rising mains and wiring and fitting of tenement dwellings, and installation of wiring and apparatus in dwelling houses, including tenement dwellings. (See this issue.)

Middlesex.—July 24th. County Council. Electrical work at the County Sanatorium, Harefield. (June 21st.)

Morley.—July 15th. Renewal of electric lighting installation at Morley Grammar School. A. Crosby, clerk to the governors, Town Hall.

Neath.—July 12th. Electricity Department. Transformer and switch kiosk with equipment, underground cables and overhead lines. (June 28th.)

New Zealand.—WELLINGTON.—Post and Telegraph Department. August 15th. Telephone cable. (A.Y. 13126.)*
August 20th. 3,000 automatic telephone dials. (A.Y. 13105.)* Telephone instrument cords. (A.Y. 13130.)*
August 21st. 15,000 terminal and leading-in insulators. (A.Y. 13127.)
Public Works Department. September 17th. Five electrically driven low-lift pumping units. (G.Y. 15277.)*
DUNEDIN.—September 25th. Corporation. Auto-synchronous electric motor and reduction gear. (A.Y. 13129.)*

Portsmouth.—July 12th. Corporation. Equipment for night flying at Municipal airport. (June 28th.)

Preston.—July 12th. Electricity Department. Meters and domestic water heating apparatus. (June 28th.)

Salford.—July 16th. Corporation. Three 6,600-V, 350,000-kVA oil circuit-breakers. (See this issue.)

Solihull and Meriden.—July 29th. Joint Hospital Committee. Electric wiring, &c., for lighting and power at the Joint Isolation Hospital, Catherine-de-Barnes. The Committee, 12, Priory Street, Coventry (deposit £1 1s.).

South Africa.—JOHANNESBURG.—Railways and Harbours Administration. July 29th. Fog signalling equipment for Cape Receiffe lighthouse. (A.Y. 13120.)*
PRETORIA.—Union Tenders and Supplies Board. July 19th. L.c. telephone cable. (A.Y. 13162.)* V.i.r. l.c. telegraph cable, wire and busbars. (A.Y. 13159.)*
July 26th. Copper wire and telephone cable. (A.Y. 13161.)*

Southend-on-Sea.—July 17th. Borough Council. Adaptation from d.c. to a.c. of motors, hairdressing equipment, dental apparatus, petrol pumps and miscellaneous apparatus. (June 21st.)

Stanley (Co. DURHAM).—July 13th. U.D.C. 6,600-V cable and one 100-kVA transformer. (June 28th.)

Stockton-on-Tees.—July 11th. Education Committee. Electric lighting fittings in schools. Education Offices, Dovecot Street.

Swansea.—July 8th. Education Committee. Electric lighting and heating installations at the Nursery school, Nelson Terrace. Borough architect, The Guildhall (deposit £2).

Uruguay.—MONTEVIDEO.—August 5th. State Electricity Supply and Telephones Administration. 38,550 metal filament lamps. (A.Y. 13122.)*

Walthamstow.—July 10th. Electricity Department. Meters. (June 28th.)

Walton & Weybridge.—July 10th. Electricity Department. Three 11,000-V kiosks and switchgear, two 300-kVA and two 150-kVA transformers and cable. (June 28th.)

Wembley.—July 9th. U.D.C. Electric lighting installation in forty-eight houses on the High Meadow housing estate, Kingsbury. (June 21st.)

West Lothian. County Council. Electrical work at fifty-six houses at Bo'ness. F. Smith & Brown, 4, Regent Street, Hamilton.

Weymouth and Melcombe Regis.—July 15th. Electricity Department. E.h.p. and l.p. cable, distributor pillars, 2,500-kVA transformers and e.h.p. and l.p. switchgear. (June 21st.)

Wimbledon.—July 17th. Town Council. Electrical thermal-storage heating and domestic hot-water supply system for new offices and stores, Durnsford Road, S.W.19. Chief engineer, Electricity Works, Durnsford Road.

Witney.—July 8th. Electricity Department. 11,000-V underground cables and overhead lines. (June 21st.)

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* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Aberdeen.—Electricity Committee. Recommended. Two steam boilers at the extension of the electricity works (£38,836). —Babcock & Wilcox, Ltd.

Bawtry.—Education Committee. Accepted. Electric lighting at Rossington schools (£228).—F. B. Thorpe (Doncaster).

Birkenhead.—Public Assistance Committee. Recommended. Electric bed lift at institution (£286).—Evans Lifts, Ltd.
Electricity Committee. Accepted. Two transformers (£383). —Electric Construction Co., Ltd. Sub-station switchgear.—Metropolitan-Vickers Electrical Co., Ltd. (£776); Ferguson Pailin, Ltd. (£314); A. Reyrolle & Co., Ltd. (£386).

Birmingham.—Electricity Committee. Accepted during the period March 1st to June 14th. Cables.—Callender's Cable & Construction Co., Ltd. Motor generator.—Metropolitan-Vickers Electrical Co., Ltd. Circuit-breakers.—Ferguson, Pailin, Ltd. Battery repairs at Saltley sub-station.—Tungstone

Accumulator Co., Ltd. Seven transformers.—Ferranti, Ltd. Reconstruction of consumers' e.h.p. switch panels.—Mudie's Electrical Co., Ltd. Battery repairs at Camden Street sub-station.—Tudor Accumulator Co., Ltd. E.h.p. switchgear at Sparkbrook and Cheapside sub-stations.—Harland Engineering Co., Ltd. Meters.—Chamberlain & Hookham, Ltd.; British Sangamo Co., Ltd.

Cardiff.—Electricity Committee. Accepted. One 250,000-kVA switch (£227).—Harland Engineering Co., Ltd. Three 75,000-kVA switches (£385) and 150,000-kVA switches (£154 each).—Ferguson Pailin, Ltd. Switchgear extension for Roath Park sub-station (£251).—Allen West & Co., Ltd.

Finchley.—Electricity Committee. Accepted. Glass bulb mercury arc rectifiers (£3,235).—Hewittic Electric Co., Ltd.

Glasgow.—Electricity Committee. Accepted. Annual contracts: Cables.—Callender's Cable & Construction Co., Ltd.; Enfield Cable Works, Ltd.; W. T. Glover & Co., Ltd.; Metropolitan Electric Cable & Construction Co., Ltd.; Craigpark Electric Cable Co., Ltd. Meters.—British Sangamo Co., Ltd.; Chamberlain & Hookham, Ltd.; Ferranti, Ltd.; Metropolitan-Vickers Electrical Co., Ltd. Cast-iron boxes, section pillars, &c.—Falkirk Iron Co., Ltd.

Housing Committee. Accepted. Electrical installations at Blackhill estate (£1,332).—J. Edward.

London.—ST. MARYLEBONE.—Baths Committee. Accepted. Electrical boiler plant for new baths (£5,740).—Sulzer Bros. (London), Ltd. Electrical wiring and fittings (£3,485).—Troughton & Young, Ltd.

Highways Committee. Recommended. Conveyor motors and magnetic separation plant at refuse depôt (£1,342).—Electromagnets, Ltd.

STEPNEY.—Electricity Supply Committee. Recommended. Dictograph interconnecting system at general offices, Osborn Street (£155).—Dictograph Telephones, Ltd. Supplies for the year ending June 30th, 1936: Tubing and fittings (£587).—Falk, Stadelmann & Co., Ltd. Shades (£165) and d.p. insulated switch fuses (£625).—Wholesale Fittings Co., Ltd. Insulated lampholders (£87).—P. L. Dwyer & Co. Ceiling roses (£95) and electric lamps (£3,674).—General Electric Co., Ltd. Joint boxes (£180).—W. White & Co. Conduits (£787).—Doulton & Co., Ltd. Troughs and covers (£528).—Sutton & Co. (Overseal), Ltd. Prepayment meters.—Ferranti, Ltd. (£2,145); Chamberlain & Hookham, Ltd. (£1,594). Demand indicators (£287).—Reason Manufacturing Co., Ltd.

CITY CORPORATION.—Improvements Committee. Recommended. Electric lighting at artisans' dwellings (£924).—G. E. Taylor & Co. (This was the lowest of six tenders, the highest being £1,249.)

Luton.—Education Committee. Accepted. Electric lighting at schools.—G. F. Thurley (£239); C. E. Rolt (£166).

Manchester.—Watch Committee. Accepted. Electric passenger lift at police headquarters.—Etchells, Congdon & Muir, Ltd.

Health Committee. Accepted. X-ray equipment for Booth Hall hospital.—Mottershead & Co.

Water Committee. Accepted. For Gorton pumping station: Electrically driven pumps, switch and starting gear.—Drysdale & Co. Transforming and converting plant.—Electric Construction Co., Ltd.

Education Committee. Accepted. Electrical work at schools.—J. Collier & Co., Ltd.; A. Loudon; A. E. Sudlow & Co., Ltd.

Electricity Committee. Accepted. Batteries and charging equipment for Benchill and Failsworth sub-stations.—Bertram Thomas. Sub-contractors: Batteries.—Britannia Batteries, Ltd. Motor generators.—Higgs Motors, Ltd. Trickle charging equipment.—Westinghouse Brake & Signal Co., Ltd. 420-V house-service switchgear for Stuart Street power station.—Metropolitan-Vickers Electrical Co., Ltd. Supplies for twelve months: Electric kettles.—Premier Electric Heaters, Ltd. Time switches.—Venner Time Switches, Ltd. A.c. motors.—Crompton Parkinson, Ltd.; British Thomson-Houston Co., Ltd.; Laurence, Scott & Electromotors, Ltd. Electricity meters.—Ferranti, Ltd.; Metropolitan-Vickers Electrical Co., Ltd.; Aron Electricity Meter, Ltd.

Mexborough.—U.D.C. Accepted. E.h.p. switchgear.—General Electric Co., Ltd. 1-3 phase 10,000/400-V transformer.—English Electric Co., Ltd.

Middlesbrough.—Corporation. Accepted. Twelve months' supply of 660-V p.i. l.c. cables.—Macintosh Cable Co., Ltd.; Enfield Cable Works, Ltd.; Hackbridge Cable Co., Ltd.

New Zealand.—Post and Telegraph Department. Accepted. Telephones (£3,000).—Siemens Bros. & Co., Ltd. Copper wire (£3,800).—Enfield Cable Works, Ltd. V.i.r. wire (£1,000).—W. T. Henley's Telegraph Works Co., Ltd. L.c. cable (£1,330).—W. T. Glover & Co., Ltd.

Tynemouth.—Corporation. Accepted. One 625-kVA three-phase transformer (£218).—C. A. Parsons & Co., Ltd. One self-regulating 250-kVA single-phase transformer (£373).—Metropolitan-Vickers Electrical Co., Ltd.

Walsall.—Electricity Department. Accepted. 70-kW mercury vapour rectifier.—Hewittic Electric Co.

Tungsten Filament Lamps

An addendum to British Standard Specification 161-1934 for tungsten filament general service electric lamps includes a schedule for lamps with coiled-coil filaments. It also makes it clear that lamps are standard with either clear or internally frosted bulbs up to and including 100 W. Copies of this addendum (Ref. CD (ELG) 6639) will be sent gratis on receipt of a stamped envelope by the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W.1.

Notes

Electrical Housecraft Summer School

The Summer School of Electrical Housecraft for teachers is to be held at the Gloucestershire Training College of Domestic Science from September 12th-17th. The course, which has been arranged by the College and the Electrical Association for Women, will include talks on the application of electricity for domestic purposes, and the speakers will include Messrs. J. W. Beauchamp, F. H. Corson and G. H. Purvis, Miss M. M. Partridge, Miss D. Vaughan, Miss E. A. Wright and Miss Whitaker. Cooking demonstrations will be given by Miss E. M. Benson. A visit will be paid to the cable works of the Edison Swan Electric Co., Ltd., at Lydbrook. Miss C. Haslett states that the school is so popular that the organisers have been unable to accept all the applications.

A British Foundry School

The founding industry has formed a provisional governing body for a new type of specialised school, which, if sufficient students present themselves, will be opened in September. The school is intended for those men engaged in the founding industry who have already had some practical experience and who wish to qualify for, or who have already shown their capacity in, managerial and supervising posts. The school will provide a full-time day course of one year's duration, and successful students will be given a diploma that will receive endorsement by the Board of Education. Out of a net running cost (total expenditure, less receipts from students' fees, fixed at £30 per annum) of £2,000 per annum the Board of Education has undertaken to provide £1,500 in the form of grants, provided the remaining £500 is forthcoming from the industry. Of this latter sum nearly one-half has been promised, leaving a balance of about £300 per annum. The school will be housed at Birmingham, in the Metallurgical Department of the Central Technical College, and Mr. J. G. Pearce will receive contributions and requests for information at 21, St. Paul's Square, Birmingham.

International Broadcasting Union

The International Broadcasting Union's summer meeting at Warsaw was concluded last week. Representatives of broadcasting organisations in twenty-two European countries, and in the United States, were present. Vice-Admiral Sir Charles Carpendale, who had been president of the Union since its foundation, retired from office, and was succeeded by M. Maurice Rambert, Administrateur-Délégué of the Société Suisse de Radiodiffusion, one of the founders of the Union. Other newcomers to office are: Vice-presidents Dr. K. von Boeckmann (Germany); M. Sigismond Chamiec (Poland); and M. Gustav Reutersward (Sweden). Among the decisions taken by the International Broadcasting Union at Warsaw was one to invite national and international groups of broadcasting organisations in all countries to a preliminary inter-Continental conference in 1936, when consideration will be given to the creation of an inter-Continental system of collaboration among broadcasters for the discussion on the widest possible basis of several international, technical, legal, administrative, and artistic broadcasting problems. Paris has been chosen as the venue for this meeting.

M. Braillard (Belgium) mentioned the improvement in the technical precision of the European broadcasting stations in recent years. He said that, whereas ten years ago broadcasting stations were known to fluctuate from 1,000 to 3,000 cycles during the course of a few hours, to-day the principal stations did not fluctuate more than one cycle in a month.

Radio Research in Australia

Recently issued, Bulletins Nos. 87-8-9 deal with the work of the Radio Research Board of the Australian Council for Scientific and Industrial Research (314, Albert Street, East Melbourne, Victoria) in the Commonwealth. Report No. 6 is concerned with anomalies in the rotation of the plane of polarisation of long waves; conclusions reached from measurements of attenuation, fading, and interference at 200 kc/s in south-eastern Australia are stated; and a field intensity measuring set and an instrument capable of recording several frequencies simultaneously are described. Report No. 7 deals with the propagation of medium waves in the ionosphere, the characteristics of downcoming waves, the influence of electric waves on the ionosphere, and long-distance observations of waves of medium frequencies. Report No. 8 contains the results of simultaneous observations of atmospherics with cathode-ray direction-finders at Toowoomba and Canberra, and of a study of atmospheric interference with reception.

Appointments Vacant

Switchboard attendants for the Mersey Power Co., Ltd.

Works superintendent (£544 per annum) for Halifax Electricity Department.

(See our classified advertisements.)

Makers' Names Wanted

T.P.S. electrical fitting.

HOCKING water heater

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. R. Ashworth has resigned from the position of controller of Electric & Musical Industries, Ltd., as from June 30th.

[*Elliott & Fry.*

Mr. A. Hugh Seabrook

Mr. A. Hugh Seabrook, M.I.E.E., who is well known as a former "chief" of the West Ham and St. Marylebone electricity undertakings, has accepted the position of "executive officer" of the Electrical Industries Benevolent Association, to which work he will in future devote the whole of his time. It is hoped that before long the E.I.B.A. will have new office quarters, but at present all communications should be addressed to 9, Southampton Street, Holborn, London, W.C.1.

Mr. H. T. Sully, consulting electrical and mechanical engineer, of Bristol, has announced his intention of retiring at the end of the present year. He will complete any work he may then have in hand or any periodical work that may require due notice.

Mr. R. D. Reynolds, of the West Gloucestershire Power Co., Ltd., has been appointed to fill the recently advertised position of South-East England Area Officer of the British Electrical Development Association.

Mr. R. D. Reynolds

Mr. H. G. Poxon informs us that, after a few months' absence, he has rejoined Klaxon, Ltd., as technical sales manager.

Mr. J. H. Storrar, A.M.I.E.E., who has been associated with the Rees Roturbo Manufacturing Co., Ltd., for a considerable number of years, has resigned from his position of engineer and works manager to take up an engineering appointment at one of the branches of the Calico Printers' Association, Ltd.

Mr. A. G. Bruty, M.I.E.E., has been elected president of the Electrical Contractors' Association for the year 1935-36, and **Mr. R. H. M. Drake,** B.A., is to be vice-president. Mr. Bruty is a Dublin contractor who has been very active in Irish electrical affairs. He was born in London and educated at St. Albans School and the London Polytechnic Engineering School. He went to Dublin in 1910 and established his present business in 1921. He has been chairman of the Irish Centre of the I.E.E., president of the Engineering and Scientific Association of Ireland, and is vice-chairman of the Irish Society of Electrical Traders, apart from his work as a member and officer of the E.C.A.

[*Elec. Rev. photo*

Mr. A. G. Bruty

[*Whitlock*

Mr. R. H. M. Drake

Mr. Drake, who has been chairman of Messrs. Drake & Gorham, Ltd., since 1931, was educated at Eton and joined the Army upon leaving in 1916. He served in the Near East and afterwards went to Magdalen College, Oxford, where he took his B.A. degree. He then joined the B.T.H. Co., and later went to America on behalf of Drake & Gorham, Ltd.

Mr. William H. Taylor, M.I.E.E., M.I.E.A., general manager and engineer of the Western Australian Government tramways, electricity supply and State ferries, who is now in London in connection with extensions to the East Perth power station, consisting of a 25,000 kW turbo-alternator, boilers, buildings, &c., went out to Perth in January, 1914, for the construction of the East Perth power station. He subsequently inaugurated what is now one of the largest systems in Australia with an output of 100,000,000 kWh per annum from a modest 2,500,000 in 1914. The new plant that he is about to put down will form the nucleus of a new station which will be the first to operate at 600 lb. steam pressure at 800 deg. F. Powdered coal is being used throughout, and a special feature of the station will be the very complete system of centralised control.

Mr. W. H. Taylor

In addition to the electricity supply system of the Government, he is also responsible for the operation of the tramways and State ferry services. We understand that Mr. Taylor introduced the first trolley-bus service into Australia, and also the first completely automatic traction substations. He is a member of the Faculty of Engineering at the Western Australian University, chairman of the Western Australian section of the Commonwealth Power Survey Committee, and a Special Inspector of Mines for the use of electricity in that industry. He hopes to return by the R.M.S. *Orama*, leaving Naples on July 28th. His present address is Savoy House, 115/116, Strand, London, W.C.2.

Mr. R. Williamson, telephone traffic superintendent at Brighton, has retired after being associated with the telephone service for forty-six years, and has been presented by his colleagues with a clock and garden chair.

Mr. J. C. Williams, electrical engineer to the Erith Urban District Council, and **Mr. F. V. L. Mathias,** M.I.E.E., electrical and tramways engineer to the Warrington Corporation, have been presented with the King's Silver Jubilee Medal.

Mr. J. G. Freeman, M.I.E.E., whose retirement from the position of manager and chief engineer of the London Electric Supply Corporation, Ltd., was recently announced

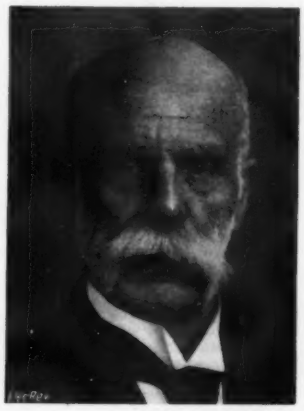
Mr. J. W. Black, M.I.E.E., has retired from the firm of Messrs. Osborne & Hunter, electrical contractors of Glasgow, of which he has been a partner for the past thirty-three years, and has recently commenced practice as a consulting engineer. His address is 43, Kelvinside Gardens, Glasgow, N.W.

Mr. A. de Jong, a director of Philips Lamps, Ltd., is a member of the executive committee of the Netherlands and Netherlands Indies Information Bureau, which has been established at Shell-Mex House, Strand, W.C., under the auspices of the Netherlands Government, in co-operation with the British Chamber of Commerce, to provide a means of promoting commercial and other relations between the British Empire and the Netherlands.

Mr. H. C. Rawson, of Sheffield, notifies us that he has, this week, changed his address to South Lodge, 42, Second Avenue, Westcliff-on-Sea. (Phone: Southend 2125.)

Obituary

Mr. William Puddicombe Granville, who died on June 26th at eighty years of age and was buried at Boscombe on June 29th, had spent fifty-five years in the service of the Telegraph Construction & Maintenance Co., which he entered in 1869. In his earlier years he took part in the laying of many of the cables manufactured by the company, including those to India, Australia, and to Newfoundland. Later he became an assistant to Mr. Willoughby Smith, senior, in his experimental work and training school for cable electricians. Shortly after the latter's retirement from the management of the Gutta Percha Works of the T.C. & M. Co. at Wharf Road, he became assistant manager to the present Mr. Willoughby Smith, who had followed his father in the position of manager. He was eventually manager of the Gutta Percha Works, a position from which he retired in 1924. Since then he has been living at Bournemouth. Unable through ill-health and advancing years to take as active an interest in electrical matters as he had done in the past, he spent much time on radiotherapy; there are many who remember with gratitude the benefit derived from his help. The fact that in his retirement he was still able to help others brought him much pleasure. Mr. Granville was sometime chairman of the London Congregational Union. He had outlived some of his friends and companions of the early days, but there must still be many in various parts of the world who will learn with regret of his death. Mr. Granville was a member of an old Devon family.



[*C. Vandyk, Ltd.*
The late Mr. W. P. Granville

Mr. Harry Buchanan.—The death occurred in a nursing home at Wotton-under-Edge, near Bristol, on June 27th, at the age of sixty-nine, of Mr. Harry Buchanan, one of the founders of Buchanan & Curwen, Ltd., electrical contractors, of Westminster, Bristol and Leatherhead.

Wills.—Mr. W. R. Elston, a director of the Calcutta Tramways Co., Ltd., Madras Electric Supply Corporation, Ltd., and Madras Electric Tramways (1904), Ltd., and secretary of other electrical companies, left £36,598 (net personalty £33,320).

Mr. E. E. Gunter, retired director of the Persian Gulf section of the Indo-European Telegraph, left £8,444, with net personalty £3,307.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Charles Alexander & Co., Ltd.—Private company. Registered June 26th. Capital, £2,500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in hair waving and hairdressing machines, apparatus and accessories, electrical fittings, dynamos, motors, batteries, lamps and fans, &c. The subscribers are: F. W. Webb, 32, Etheldene Avenue, N.10, and L. G. Bradford, 385, Long Lane, N.2. Solicitor: O. L. Richardson, 231, Strand, W.C.2.

Reeds Electrical (Southall), Ltd.—Private company. Registered June 26th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electrical, wireless and general engineers, &c. The directors are: C. E. Reed, 48, Minterne Avenue, Norwood Green, Southall, and T. J. Crutchfield, 111, Cranbourne Way, Hayes, Middlesex.

Fredk. Lamb, Ltd.—Private company. Registered June 26th. Capital, £2,000 in £1 shares. Objects: To acquire the business of an electrical engineer carried on by Fredk. Lamb at Parade Chambers, South Parade, Nottingham. The subscribers are: F. Lamb, electrical engineer, and Mrs. Fanny T. Lamb, both of Fern Hill, Cropwell Bishop, Notts. F. Lamb is first director.

H. D. Thain, Ltd.—Private company. Registered June 26th. Capital, £1,500 in £1 shares. Objects: To carry on the business of electrical contractors, manufacturers of and wholesale and retail dealers in electrical goods and equipment, &c., including fittings, lamps and heating apparatus, commercial and other signs, &c. The first directors are: H. D. Thain, 94, Hartfield Road, S.W.19, and A. Todd, 105, Woodside, S.W.19. Registered office: 1a, Strathearn Road, S.W.19.

Safety Fuses, Ltd.—Private company. Registered June 24th. Capital, £10,000 in 5s. shares. Objects: To acquire from F. T. Jenkins and S. D. Sparke the benefit of an invention relating to mercury cut-outs, and to carry on the business of electrical engineers and contractors, manufacturers of and dealers in electrical apparatus, &c. The subscribers are: J. R. Neill, 3, Templewood Avenue, Hampstead, N.W.3, and E. C. Dix, 17, Sheldon Avenue, Highgate, N.6. Solicitors: Wm. Easton & Sons, 43, London Wall, E.C.

London Electric Appliances, Ltd.—Private company. Registered June 26th. Capital, £15,000 in 14,000 6 per cent. preference shares of £1 and 20,000 ordinary shares of 1s. each. Objects: To carry on the business of manufacturers, engineers, designers, advisers, experts, consultants and the like in connection with wireless telephony or telegraphy, &c. The first directors are: W. H. W. Gossage, 2, Hanover Terrace, N.W.1, and three others.

Electro-Alloys, Ltd.—Private company. Registered June 24th. Capital, £10,000 in £1 shares (7,000 5 per cent. cumulative participating preference, 2,500 "A" ordinary, and 500 "B" ordinary). Objects: To carry on the business of manufacturing and treating by electrolytic, chemical and other means, tungsten, molybdenum and other metals and substances, and the products and compounds thereof, &c., and to adopt an agreement with M. A. Halle & Co., Ltd., and Max. A. Halle. The permanent directors are: L. Goldschmidt, 54, Victoria Street, S.W.1, and two others. Solicitors: Bulcraig & Davis, Amberley House, Norfolk Street, W.C.2.

Ceseo, Ltd.—Private company. Registered June 24th. Capital, £1,000 in £1 shares. Objects: To carry on the business of merchants, manufacturers and repairers of and dealers in all kinds of electrical equipment relating to motor-cars and transport vehicles of all kinds, &c. The first directors are: H. Woodward, 19, The Broadway, Wood Green, N.22, and two others. Secretary: Mrs. L. Woodward. Registered office: 19, The Broadway, Wood Green.

A. & E. Hill, Ltd.—Private company. Registered June 24th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacurers of and wholesale and retail dealers in electrical, mechanical and musical apparatus, and accessories, wireless and radio sets, &c. The subscribers are: A. Hill, 874, Christchurch Road, Bournemouth, and Mrs. Elizabeth Hill. A. Hill is the first and permanent director. Registered office: 874, Christchurch Road, Bournemouth.

Electrical Equipments (Cardiff), Ltd.—Private company. Registered June 20th. Capital, £500 in £1 shares. Objects: To carry on the business of electrical and wireless engineers, contractors, manufacturers and repairers, &c. The subscribers are: C. J. Geldard, 49, Mount Stuart Square, Cardiff, and S. Tylke, 6, Stanwell Road, Penarth. Secretary; J. C. Davies. Registered office: 40a, Eisteddfod Street, Wood Street, Cardiff.

Euston Sales & Exchange, Ltd.—Private company. Registered June 11th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers and distributors of and dealers in wireless and electrical apparatus and equipment, engineering implements and instruments, electrical devices and appliances, &c. The subscribers are: C. P. Wells, 3, Burlington Gardens, W.1; and I. K. Barker, 55, Larch Road, N.W.2. Registered office: 306, Euston Road, N.W.1.

Purley Electrical Co., Ltd.—Private company. Registered June 12th. Capital, £500 in £1 shares. Objects: To carry on the business of electrical engineers, manufacturers of and dealers in electrical equipment, wireless, television, etc. The permanent directors are: R. O. Woodruff (chairman), and R. F. E. Woodruff, both of "Boleyn," Tudor Close, Old Coulsdon, Surrey. Registered office: 4, Bridge Parade, Purley, Surrey.

Returns of Electrical Companies

Wholesale Lamp Co., Ltd.—H. E. Wall, incorporated accountant, of 47, Milsom Street, Bath, was appointed receiver on June 20th, 1935, under powers contained in debentures dated February 18th, 1935.

Anchor Cable Co., Ltd.—Satisfaction in full on June 30th, 1934, of trust deed dated November 16th, 1906, and registered December 2nd, 1908, securing £60,000 debenture stock. (Notice filed June 21st, 1935.)

E. Hammond & Co. (Auto-Electric), Ltd.—Capital, £1,600 in 400 preference and 1,200 ordinary shares of £1. Return dated December 25th, 1934 (filed May 14th, 1935). £302 preference and 1,200 ordinary shares taken up. £702 paid on 302 preference and 400 ordinary shares, £800 considered as paid on 800 ordinary shares. Mortgages and charges nil.

L.R. Supply Co., Ltd.—Satisfaction to the extent of £1,500 on June 19th, 1935, of debenture dated May 26th, 1933, and registered June 13th, 1933.

Nulite Fittings, Ltd.—A. S. Price, of 8, Exchange Street, Manchester, was appointed receiver and manager on June 18th, 1935, under powers contained in debenture dated April 16th, 1935.

Mid-Lincolnshire Electric Supply Co., Ltd.—The nominal capital has been increased by the addition of £100,000 in £1 ordinary shares beyond the registered capital of £300,000.

Lincolnshire & Central Electric Supply Co., Ltd.—The nominal capital has been increased by the addition of £250,000 beyond the registered capital of £250,000. The additional capital is divided into 250,000 4½ per cent. cumulative preference shares of £1 each.

City Notes

The General Electric Co., Ltd., held its annual meeting on June 27th, Lord Hirst (chairman and managing director), presiding. In presenting the report and accounts (ELECTRICAL REVIEW, June 21st, page 926), the chairman said their net profits of £1,184,483 exceeded the best year they had ever had and were due to the better conditions prevailing in the country, better export business and improvements within the electrical industry itself. Their total exports increased over last year by 40 per cent., but they were not yet back to the former high standard of 1929/30. Their share of the total export of the British electrical industry had again somewhat improved during last year. The causes of a more flourishing overseas business in the industry were to be found in the abnormal activity in the gold mining industry, and the prosperity of Palestine, in which country they had been the electrical contractors to the Palestine Electric Corporation. With the exception of China and France, where economic conditions had been unsatisfactory, a bigger business was secured in every one of their markets. South Africa had taken the lead as their principal market, India dropping to second place, with Palestine third, and Australia fourth, the position of the last named country being partly due to the fact that they had commenced local manufacture. Of their shipments 69 per cent. went to Empire countries. The engineers at their research laboratories and works were watching any developments in all parts of the world. To single out one department (the Department of Communication), for many years this country lagged behind other important countries of the world in communications. Under the leadership of the former Postmaster-General (Sir Kingsley Wood), however, the long overdue expansion of the telephone service had been little short of spectacular. There was to be a widening of the service in rural areas, and it was proposed by the end of 1936 to provide a public call box in every village where there was a Post Office. Given normal conditions, they could look forward to a busy period in the telephone industry for some time to come. Scientific investigation in America, Germany and this country had resulted in a discovery whereby as many as 200 speech channels could be provided by means of carrier current over a single conductor of somewhat revolutionary design. The application of such a discovery would be an influence of first magnitude upon the introduction of a television service.

Dealing with television, Lord Hirst said that although it must come, there was a danger of the public being somewhat misled by statements of an unbalanced character which had appeared in a section of the Press. It should be appreciated that there was a difference between what could be done and even done well in a laboratory, and the establishment of a national service. The perfection of the art would follow the same course as every other product of scientific research and engineering skill, and it would steadily improve as time went on. Technically they held a strong position in this field and their developments were well advanced.

Referring to the "Osira" lamp, the chairman said that some hundreds of miles of roadway in Great Britain were now lighted by them by this means, and further improvements had been made which had enabled them to find a better way of lighting big workshops. The development of aviation had created a demand for aerodrome lighting of a kind which required the highest technical skill to meet the need for ground lighting, for border lighting, beacons, signalling and wind direction indicators.

With regard to heavy engineering they were building new turbo-generators up to 60,000 kVA, and the largest mercury rectifiers required by the industry. They had met with success in the equipment of complete electric ships. The establishment of the grid made an ever-increasing demand for complicated switchgear. In order to meet this situation they had just completed the installation of a testing station of 2,000,000 kVA breaking capacity at their Witton works. The mechanisation of coal mines was progressing satisfactorily, and they had had particular success with their Chance coal washing plant. The equipping of steel works with rolling mills, electric furnaces and other appliances formed an important part of their activities. Railway electrification was now coming into its own, and the trolley-bus was quickly superseding tramways both at home and overseas. The demand for radio apparatus and domestic products was going ahead, and even agriculture was now becoming quite a respectable market for the application of electricity.

The 132,000-V Pirelli oilfilled cable—the first cable of this voltage to be used in this country—which they made and installed for the Central Electricity Board four years ago, had been in successful operation for this period, and a further fifty miles of similar cable had been manufactured for the Board during the past year, in addition to many other cables for 66,000 and 33,000 V, including over 100 miles for the Southern Railway electrification. The chairman then quoted figures from the accounts to illustrate the benefits of the electrical industry to the country.

He said that they had spent nearly £4,000,000 in wages. In local rates, income tax, unemployment insurance, and National Health and Pension Insurance they had spent over £400,000. Coal and coke, electricity, gas, water and other services had amounted to £236,000. Freight, postage and cablegrams had amounted to nearly £400,000, and purchases of raw materials such as steel, pig-iron, brass, copper, cotton, rubber and sundry raw materials amounted to well over £3,000,000. These figures illustrated how the electrical industry contributed to the well-being of other industries.

Referring to their subsidiaries, the Electrical Development and Securities Trust, which administered utility companies in which they were interested, was making steady headway. Their companies had shown an increase of 25 per cent. in their output of electricity during the last year. Most of them were just emerging from the development stage, and such progress should bring them into a position within the next few years to make a healthy contribution towards the earning capacity of the company.

Dealing with the business outlook in this country, Lord Hirst said that the electrical industry was particularly grateful to the Government for its efforts in telephony, its building policy, and its support of the steel industry, all of which reacted favourably on the electrical industry. He hoped the Government would continue its efforts to encourage suburban electrification in many centres which lent themselves to profitable enterprise. He was certain that finance could easily be obtained, and nothing would bring more life to the basic industries which had been suffering in the past, than a forward electrical transport policy. This was not a purely selfish argument, as a scheme, such as that which had recently been published, requiring an expenditure of £35,000,000 was one in which the electrical industry at the most could participate to the extent of only £4,000,000 or £5,000,000. If no unexpected great political disturbance happened elsewhere in the world, the country would progress satisfactorily during the next few years. There was no saturation point in view yet. The better dividends which were being paid, as well as the better wages, would increase the purchasing power of the public, and the accumulated effect of all this had probably not yet started to affect the situation. The export business equally would bring grist to the mill as other countries recovered from the depression, and signs were not wanting that a number of them had already begun to lift their heads again.

W. T. Henley's Telegraph Works Co., Ltd., held its annual meeting on June 28th, when Sir Montague Hughman (chairman), who presided, in presenting the report and accounts (ELECTRICAL REVIEW, June 21st, page 927), said that during the year under review they had spent £77,000 on additions and extensions. They commenced the erection of a new building at the North Woolwich Works, which would enable them to work under more satisfactory conditions and with greater efficiency, as well as to provide additional space for the increasing demand on the rubber cable side of their business. During the year commodity prices remained low, and in the case of copper and lead, record low levels were reached. In 1929 copper wire bars touched £112 per ton and lead £29 15s. per ton, whereas in 1934 copper dropped to the low level of £29 5s. per ton and lead to £10 per ton. These low prices were not good for their business, as the lower the price of commodities the less their cash turnover was. At their Woolwich works they had had a record output, and their Gravesend works had maintained the high output which they reached last year. Business during the year had been difficult, and what with competition and low prices of commodities the tendency was a lower percentage of profits. Their business abroad continued to expand, but the expansion was almost entirely due to increased business within the British Empire, business with foreign countries being handicapped by exchange difficulties and other restrictions. With regard to the agreement entered into with certain other cable companies for an interchange of knowledge and co-operation, this agreement had now been running for over eight years, and had been of great benefit to all concerned. Research was continually going on, and the exchange of ideas and methods of manufacture had helped them to produce their cables at more economical rates, and certain savings had been effected which had enabled them to lower their prices; this in due course must lead to an increasing demand. Competition had been of a severe nature in certain classes of their business, and co-operation of the allied companies had been of use of them in this direction. The financial arrangements, however, had not worked out equitably between the parties, and he hoped the matter which was now under discussion would be settled before long. The Tyre Company had been reorganised, and whilst this company had made a loss during the past year they looked forward during the next few years with confidence to greatly improved financial results and to the extension of this business at home and abroad. Their South African subsidiary had consistently paid substantial dividends to the parent company in the past, and this year had shown equally satisfactory profits.

There had been a certain falling-off in turnover in their Contract Department, the chief reason being the completion of the Central Electricity Board's work. Several important contracts had been carried out during the year, including 33,000 V submarine crossings at Belfast and Brisbane, and they had completed a large contract for a 66-kV overhead transmission line in India. The Holborn Construction Co., incorporated less than a year ago, had already completed some satisfactory civil engineering contracts. The small loss incurred during the first few months of working had been provided for out of the accounts of the parent company, and they were already enengaged on other contracts, which, when completed, should not only cover this loss, but also show a margin of profit. The extensive sales of their "Superite" and "Supertuff" rubber cables had more than justified the costly research work which accompanied their development, and their rubber cable business in every branch had made rapid strides. On the paper cable side they had done satisfactory business. Their chief engineer, Dr. Dunsheath, had invented a high voltage cable, known as the gas-cushion cable, and an experimental length was being laid in Holland to operate at 150,000 V. Regarding the future, there were at last prospects of the prices of copper and lead increasing and this should cause an increase in the value of their turnover. A substantial amount of work had been carried forward for next year's account. The outlook was more promising at home, whilst abroad they were always ready to take full advantage of any improvement in trade that might develop.

Mr. W. F. Bishop, in seconding the adoption of the report and accounts, referred to the extensions at North Woolwich, and said that during the next few years the demand for vulcanised rubber cables would increase owing to the large amount of building work being carried out and the increasing use of electricity for domestic purposes. The reorganisation of the Tyre Co. was a step in the right direction, and it was their intention to add other lines as they deemed it advisable.

The Underground Electric Railways Co. of London, Ltd.—The final meeting of members of this company (in liquidation) was held on June 27th, when the liquidator, Lord Ashfield, submitted an account showing how the winding-up had been conducted. The liquidator said that the task had involved the preparation and issue of stock certificates to 26,500 stock and share holders and the distribution of a sum of money in cash

in three separate payments to 18,500 shareholders. The receipts during the liquidation had amounted to £1,979,912, and the total of all the disbursements, including a proposed fee to the liquidator of £2,000, amounted to £1,921,338, leaving a balance of £58,574 for final distribution to the ordinary shareholders, who would receive on July 9th 1.3137d. per share. Lord Ashfield outlined the history of the company from its formation in 1902, showing the important part it had played in the development of London transport. Summarising the results of the scheme for the distribution of the assets of the company to shareholders, he said that, broadly speaking, on the basis of a holding of 100 ordinary shares of the Underground Co. the scheme worked out as follows:—(a) £117 of London Passenger Transport Board "C" stock; (b) 4 6/11ths North Metropolitan Electric Power Supply Co. £1 ordinary shares; (c) 13½ Associated Equipment Co. £1 ordinary shares; (d) the right to subscribe for five North Metropolitan Electric Power Supply Co. ordinary shares at 42s. 6d. per share, compared with an approximate market price at the time of 58s. per share; (e) cash distributions amounting to £3 17s. 7d.

The Victoria Falls & Transvaal Power Co., Ltd., reports a net profit for 1934 of £402,220, as compared with £360,960 for the preceding year, after allocating £777,971 for depreciation, taxation, renewals, fund provision, &c. Reserve receives £332,113, and the ordinary dividend is maintained at 15 per cent., leaving £50,765 to be carried forward. The directors have further declared a bonus of 5 per cent., less tax (same), out of exchange reserve. The balance of exchange reserve (£76,848) has been transferred to reserve fund. The report states that arrangements are in hand for the expenditure of substantial sums on the erection of transmission and distribution lines for supplying consumers in the new area. The directors have decided, in view of the large sum which has been expended, to make the issued capital correspond more closely than at present with the capital actually employed in the business. They therefore propose to capitalise £1,500,000 of the reserve by the issue of 1,500,000 £1 ordinary shares, fully paid, being in the ratio of three new shares to every two ordinary shares already held. The proposal will be submitted at an extraordinary meeting which will be held after the annual meeting on July 17th, and upon the proposal being put into effect the capital will be increased to £4,500,000 and the reserve fund will stand at £220,000.

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Stocks and Shares

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STOCK Exchange market strength is well maintained, notwithstanding the approach of the holiday season, the spate of new issues, the counter-attractions of sporting events, and the various other influences which at this particular time of the year generally make their influence felt in diverting attention towards fields other than those of finance. The approach of the General Election is spurring the Government spokesmen to statements which indicate the manner of the country's progress in its various industrial branches. Last week-end several members of the Government spoke in cheerful fashion regarding the outlook as it related to increase of employment and a further quickening of the wheels of trade. All such prophecies of improvement in industry are held to contain a hint that capital will have to be withdrawn from gilt-edged stocks in order that it may be utilised in the development of commerce. Up to the present, however, very little sign of this has become apparent; gilt-edged stocks remain at their previous high levels, and new issues of large amount find ready acceptance by investors prepared to accept little more than 3 per cent. on their money, provided the security is safe. Some of the popular iron and steel companies' shares yield but little more at current prices, but demand insists upon buying good ordinary issues. Babcock & Wilcox, with a rise to 49s. 6d., give a shade under 3¼ per cent. on the money.

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City Notes

The General Electric Co., Ltd., held its annual meeting on June 27th, Lord Hirst (chairman and managing director), presiding. In presenting the report and accounts (ELECTRICAL REVIEW, June 21st, page 926), the chairman said their net profits of £1,184,483 exceeded the best year they had ever had and were due to the better conditions prevailing in the country, better export business and improvements within the electrical industry itself. Their total exports increased over last year by 40 per cent., but they were not yet back to the former high standard of 1929/30. Their share of the total export of the British electrical industry had again somewhat improved during last year. The causes of a more flourishing overseas business in the industry were to be found in the abnormal activity in the gold mining industry, and the prosperity of Palestine, in which country they had been the electrical contractors to the Palestine Electric Corporation. With the exception of China and France, where economic conditions had been unsatisfactory, a bigger business was secured in every one of their markets. South Africa had taken the lead as their principal market, India dropping to second place, with Palestine third, and Australia fourth, the position of the last named country being partly due to the fact that they had commenced local manufacture. Of their shipments 69 per cent. went to Empire countries. The engineers at their research laboratories and works were watching any developments in all parts of the world. To single out one department (the Department of Communication), for many years this country lagged behind other important countries of the world in communications. Under the leadership of the former Postmaster-General (Sir Kingsley Wood), however, the long overdue expansion of the telephone service had been little short of spectacular. There was to be a widening of the service in rural areas, and it was proposed by the end of 1936 to provide a public call box in every village where there was a Post Office. Given normal conditions, they could look forward to a busy period in the telephone industry for some time to come. Scientific investigation in America, Germany and this country had resulted in a discovery whereby as many as 200 speech channels could be provided by means of carrier current over a single conductor of somewhat revolutionary design. The application of such a discovery would be an influence of first magnitude upon the introduction of a television service.

Dealing with television, Lord Hirst said that although it must come, there was a danger of the public being somewhat misled by statements of an unbalanced character which had appeared in a section of the Press. It should be appreciated that there was a difference between what could be done and even done well in a laboratory, and the establishment of a national service. The perfection of the art would follow the same course as every other product of scientific research and engineering skill, and it would steadily improve as time went on. Technically they held a strong position in this field and their developments were well advanced.

Referring to the "Osira" lamp, the chairman said that some hundreds of miles of roadway in Great Britain were now lighted by them by this means, and further improvements had been made which had enabled them to find a better way of lighting big workshops. The development of aviation had created a demand for aerodrome lighting of a kind which required the highest technical skill to meet the need for ground lighting, for border lighting, beacons, signalling and wind direction indicators.

With regard to heavy engineering they were building new turbo-generators up to 60,000 kVA, and the largest mercury rectifiers required by the industry. They had met with success in the equipment of complete electric ships. The establishment of the grid made an ever-increasing demand for complicated switchgear. In order to meet this situation they had just completed the installation of a testing station of 2,000,000 kVA breaking capacity at their Witton works. The mechanisation of coal mines was progressing satisfactorily, and they had had particular success with their Chance coal washing plant. The equipping of steel works with rolling mills, electric furnaces and other appliances formed an important part of their activities. Railway electrification was now coming into its own, and the trolley-bus was quickly superseding tramways both at home and overseas. The demand for radio apparatus and domestic products was going ahead, and even agriculture was now becoming quite a respectable market for the application of electricity.

The 132,000-V Pirelli oilfilled cable—the first cable of this voltage to be used in this country—which they made and installed for the Central Electricity Board four years ago, had been in successful operation for this period, and a further fifty miles of similar cable had been manufactured for the Board during the past year, in addition to many other cables for 66,000 and 33,000 V, including over 100 miles for the Southern Railway electrification. The chairman then quoted figures from the accounts to illustrate the benefits of the electrical industry to the country.

He said that they had spent nearly £4,000,000 in wages. In local rates, income tax, unemployment insurance, and National Health and Pension Insurance they had spent over £400,000. Coal and coke, electricity, gas, water and other services had amounted to £236,000. Freight, postage and cablegrams had amounted to nearly £400,000, and purchases of raw materials such as steel, pig-iron, brass, copper, cotton, rubber and sundry raw materials amounted to well over £3,000,000. These figures illustrated how the electrical industry contributed to the well-being of other industries.

Referring to their subsidiaries, the Electrical Development and Securities Trust, which administered utility companies in which they were interested, was making steady headway. Their companies had shown an increase of 25 per cent. in their output of electricity during the last year. Most of them were just emerging from the development stage, and such progress should bring them into a position within the next few years to make a healthy contribution towards the earning capacity of the company.

Dealing with the business outlook in this country, Lord Hirst said that the electrical industry was particularly grateful to the Government for its efforts in telephony, its building policy, and its support of the steel industry, all of which reacted favourably on the electrical industry. He hoped the Government would continue its efforts to encourage suburban electrification in many centres which lent themselves to profitable enterprise. He was certain that finance could easily be obtained, and nothing would bring more life to the basic industries which had been suffering in the past, than a forward electrical transport policy. This was not a purely selfish argument, as a scheme, such as that which had recently been published, requiring an expenditure of £35,000,000 was one in which the electrical industry at the most could participate to the extent of only £4,000,000 or £5,000,000. If no unexpected great political disturbance happened elsewhere in the world, the country would progress satisfactorily during the next few years. There was no saturation point in view yet. The better dividends which were being paid, as well as the better wages, would increase the purchasing power of the public, and the accumulated effect of all this had probably not yet started to affect the situation. The export business equally would bring grist to the mill as other countries recovered from the depression, and signs were not wanting that a number of them had already begun to lift their heads again.

W. T. Henley's Telegraph Works Co., Ltd., held its annual meeting on June 28th, when Sir Montague Hughman (chairman), who presided, in presenting the report and accounts (ELECTRICAL REVIEW, June 21st, page 927), said that during the year under review they had spent £77,000 on additions and extensions. They commenced the erection of a new building at the North Woolwich Works, which would enable them to work under more satisfactory conditions and with greater efficiency, as well as to provide additional space for the increasing demand on the rubber cable side of their business. During the year commodity prices remained low, and in the case of copper and lead, record low levels were reached. In 1929 copper wire bars touched £112 per ton and lead £29 15s. per ton, whereas in 1934 copper dropped to the low level of £29 5s. per ton and lead to £10 per ton. These low prices were not good for their business, as the lower the price of commodities the less their cash turnover was. At their Woolwich works they had had a record output, and their Gravesend works had maintained the high output which they reached last year. Business during the year had been difficult, and what with competition and low prices of commodities the tendency was a lower percentage of profits. Their business abroad continued to expand, but the expansion was almost entirely due to increased business within the British Empire, business with foreign countries being handicapped by exchange difficulties and other restrictions. With regard to the agreement entered into with certain other cable companies for an interchange of knowledge and co-operation, this agreement had now been running for over eight years, and had been of great benefit to all concerned. Research was continually going on, and the exchange of ideas and methods of manufacture had helped them to produce their cables at more economical rates, and certain savings had been effected which had enabled them to lower their prices; this in due course must lead to an increasing demand. Competition had been of a severe nature in certain classes of their business, and co-operation of the allied companies had been of use of them in this direction. The financial arrangements, however, had not worked out equitably between the parties, and he hoped the matter which was now under discussion would be settled before long. The Tyre Company had been reorganised, and whilst this company had made a loss during the past year they looked forward during the next few years with confidence to greatly improved financial results and to the extension of this business at home and abroad. Their South African subsidiary had consistently paid substantial dividends to the parent company in the past, and this year had shown equally satisfactory profits.

There had been a certain falling-off in turnover in their Contract Department, the chief reason being the completion of the Central Electricity Board's work. Several important contracts had been carried out during the year, including 33,000 V submarine crossings at Belfast and Brisbane, and they had completed a large contract for a 66-kV overhead transmission line in India. The Holborn Construction Co., incorporated less than a year ago, had already completed some satisfactory civil engineering contracts. The small loss incurred during the first few months of working had been provided for out of the accounts of the parent company, and they were already engaged on other contracts, which, when completed, should not only cover this loss, but also show a margin of profit. The extensive sales of their "Superite" and "Supertuff" rubber cables had more than justified the costly research work which accompanied their development, and their rubber cable business in every branch had made rapid strides. On the paper cable side they had done satisfactory business. Their chief engineer, Dr. Dunsheath, had invented a high voltage cable, known as the gas-cushion cable, and an experimental length was being laid in Holland to operate at 150,000 V. Regarding the future, there were at last prospects of the prices of copper and lead increasing and this should cause an increase in the value of their turnover. A substantial amount of work had been carried forward for next year's account. The outlook was more promising at home, whilst abroad they were always ready to take full advantage of any improvement in trade that might develop.

Mr. W. F. Bishop, in seconding the adoption of the report and accounts, referred to the extensions at North Woolwich, and said that during the next few years the demand for vulcanised rubber cables would increase owing to the large amount of building work being carried out and the increasing use of electricity for domestic purposes. The reorganisation of the Tyre Co. was a step in the right direction, and it was their intention to add other lines as they deemed it advisable.

The Underground Electric Railways Co. of London, Ltd.—The final meeting of members of this company (in liquidation) was held on June 27th, when the liquidator, Lord Ashfield, submitted an account showing how the winding-up had been conducted. The liquidator said that the task had involved the preparation and issue of stock certificates to 26,500 stock and share holders and the distribution of a sum of money in cash

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Cable and Wireless

Cable & Wireless (Holding) has agreed to extension of the date to Monday, July 15th, for acceptance by holders of the

preference stock of the repayment offer at par. The directors have announced that over six million pounds has been tendered by the preference stockholders for repayment at 100. The company propose to purchase for cancellation £7,739,625, being a third of the issued amount of the preference capital. The offer whereby stockholders were allowed to tender more than a third of their holding for repayment at 100, if they wished to do so, is now closed. Another circular is expected to be issued during the course of the present week. Those who still linger in doubt as to whether they should accept the offer or not find themselves in a further difficulty owing to the fact that the price of the stock has risen to 102¼. To offer stock for repayment at 100, when that same stock can be sold at a higher price, may not appeal to a great many people. Yet it is only upon the acceptance of the offer by the necessary one-third majority that the plan will become operative in such manner as to enhance the value of the preference stock; and, at the same time, bring within sight a possible dividend upon the "A" ordinary. The price of the latter rose to 29¾ before reacting to 28. The "B" has moved down to 9. Globe ordinary shed 5s., going back to 14½, the same price as the preference. Then buyers came along, a shortage of market supply was revealed, and the price went up to 15½. This leaves a rise of 15s. on the week.

Electricity Supply Shares

Chelsea ordinary at 34s. have moved up to the same level as that occupied by most of the other ordinary shares in their particular class. Metropolitans are better at 53s. 6d. In the provincial group, Midland Counties stand out with a rise of 1s. 6d. to 39s. The Yorkshire Electric Power Company is making an issue of £1,000,000 in 3½ debenture stock, dated 1955-1965, at 100. The company will have the right to redeem stock in 1955 at 101. It will be definitely repayable at 100 in 1965. The East Suffolk Electricity Distribution Company, all of whose issued shares are held by the British Power & Light Corporation, proposes to purchase the Woodbridge & District Electric Light Company. The movement towards amalgamation, either by purchase or other arrangement, between the smaller electricity supply companies makes steady progress. North Eastern Electric 3½ per cent. debenture stock can be bought at 100 free of stamp and fee.

Chairmen's Speeches

General Electric ordinary at 57s. 6d., have lost 1s. of their half-a-crown rise last week. The chairman, Lord Hirst, at the general meeting of the company, said that, in the absence of political and foreign upheaval, this country will progress satisfactorily during the next few years; "there is no saturation point in view as yet."

At the meeting of W. T. Henley's Telegraph Co. the chairman, Sir Montague Hughman, remarked that low commodity prices are not welcomed by consumers of such commodities any more than by the producers. Henley's are maintaining their regular 30 per cent. dividend, and the chairman gave the reasons that justify the board in making a draft upon contingent reserves in order to continue this rate of dividend. The ordinary shares are 2s. 6d. down on the week at 6¾.

Investment Demand

British Aluminium enjoyed a considerable jump to 41s., one market explanation being that people who saw big profits on other shares, in companies connected with the same class of business, were taking their profits on these and putting the money into British Aluminium. Associated Electrical Industries ordinary have also had a jump on buying for account of the investor who is prepared to put away shares for, it may be, a year or two, with the expectation of getting an increase in dividend and capital value later on. Aron Electricity went back to £3. On a comparatively small demand, Telegraph Constructions rose 2s. 6d. to 27s. 6d. Telephone Rentals, after a recovery to 8s. 9d., went a shade lower, and Telephone Manufacturing at 6s. 10½d. are a trifle down.

Crompton Parkinsons

Lively fluctuations have occurred in the prices of Crompton Parkinson ordinary and "A" shares. On Friday in last week they touched 70s., reacting, however, to 66s. 3d., the fall being due to disappointment at there being no statement from the directors such as hopefulness had anticipated might be made over the last week-end. It was thought that the Crompton Parkinson board might issue an interim report, giving profits to date, and hinting, possibly, at a share bonus to be distributed in due course. As nothing transpired, some of the bulls sold their shares, with the result as already stated.

The majority of shareholders in Cromptons, or in any other company, will no doubt feel that, save under very exceptional circumstances, the issue of a statement by any board of directors at a time other than that usually associated with such publication, is scarcely dignified; it might quite easily turn out to be misleading. Some of the iron and steel companies have been doing extraordinarily well of late, but the directors have not considered it necessary or desirable to inform their fellow-proprietors of the course of their companies' progress. Holders of Crompton Parkinsons can infer for themselves, by the rise in the price of the shares, that the company must be prospering; and, in such circumstances, they are hardly likely to part with their interests.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend 1933.	Dividend 1934	Price. July 2.	Rise or Fall.	Yield p.c. £ s. d.
Bournemouth and Poole	1	15	15	77/6	—	3 17 5
Brompton Ordinary	1	7	7	34/–	—	4 2 4
Charing Cross Ordinary	1	7	7	34/–	—	4 2 4
Chelsea	1	7	7	34/–	+6d.	4 2 4
City of London	1	7½	7½	36/–	—	4 3 4
Clyde Valley	1	7	8	43/6	—	3 13 5
County of London	1	10½	10½	57/6	—	3 13 1
Edmundson's 7% Pref.	1	7	7	36/–	—	3 16 9
Elec. Dis. Yorkshire	1	9	9	48/6	+6d.	3 14 3
Elec. Supply Corporation ...	1	11	11	3 3/8	—	3 11 10
Kensington Ordinary	1	7	7	34/–	—	4 2 4
Lancs Light and Power	1	7½	7½	39/–	—	3 17 0
London Electric	1	7	8	38/–	—	4 4 3
Metropolitan	1	10	10	53/6	+6d.	3 14 5
Midland Counties	1	7	7	39/–	+1/6	3 11 10
Mid. Elec. Power	1	8	8	41/3	—	3 18 0
North Eastern Electric Ordinary	1	6	6	34/6	—	3 9 8
Do. 7% Pref.	1	7	7	36/–	—	3 17 9
Northampton	1	10	10	53/9	—	3 14 1
Notting Hill 6% Pref.	10	6	6	14¾	—	4 1 4
North Met. Elec. Ordinary ...	1	10	10	63/9	–6d.	3 2 6
Do. do. 6% Pref.	1	6	6	32/–	—	3 15 0
St. James and Pall Mall	1	7	8½	34/–	—	4 17 1
Scottish Power	1	8	8	42/6	—	3 15 4
South London	1	7	7	35/–	—	4 0 0
Westminster Ordinary	1	7	7	34/–	—	4 2 4
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	24/6	—	6 2 5
Yorkshire Elec.	1	8	8	44/6	—	3 12 0

PUBLIC BOARDS.

Central Electricity, 1950–70 ...	Stock	5	5	116½	—	4 5 9
Do. 1955–75 ...	,,	5	5	118½	—	4 4 5
Do. 1951–73 ...	,,	4½	4½	110	—	4 1 10
Do. 1963–93 ...	,,	—	3½	104	+1½	3 7 0
London & Home Counties, 1955–75	,,	4½	4½	112xd	—	4 0 6
London Passenger Transport, A...	,,	—	4½	124½	—	3 12 3
Do. do. B...	,,	—	5	127½	—	3 18 9
Do. do. C...	,,	3	—	99	—	3 0 7
West Midlands Joint Elec. 1948–68	,,	—	5	115	—	4 7 0

TELEGRAPH AND TELEPHONE.

American Tel. & Tel.	$100	9	9	127½	–3	7 1 2
Anglo-Am. Tel. Pref.	Stock	6	6	116½	—	5 3 0
Do. Def.	,,	1½	1½	27½	—	5 9 1
Cable & Wireless 5½% Pref. ...	,,	2¼	4½	102½	–2	4 1 3
Do. A. 7½% Ord.	,,	Nil	Nil	28	–1½	—
Do. B. Ord.	,,	Nil	Nil	9	–½	—
Globe Tel. & Tel. Ord.	10	2½	3½	15½	+½	2 5 3
Do. do. Pref.	10	6	6	14½	—	4 2 9
Great Northern Tel.	10	20	20	39	—	5 5 3
Marconi-Marine	1	10	7½	35/–	—	4 5 9
Oriental Telephone Ord.	1	12	12	3 3/8	—	*3 12 5

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref. ...	5	Nil	Nil	2/–	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5	—	—
British Electric Traction Df. Ord.	,,	5	5	1135	+65	—
Do. do. Pref. Ord.	,,	8	8	176½	—	4 10 8
Brazil Traction	100	—	—	9	–½	—
Brit. Columbia Elec. Rly. Pce. ...	Stock	5	5	97½	—	5 2 8
Mexican Light Common	100	Nil	Nil	3	—	—
Do. 7% Pref.	100	7	7	5½	—	—
Do. 1st Bonds	$500	5	5	42½	—	—
Victoria Falls Ord.	1	15	20	7	—	2 17 2
Yorkshire (West Riding) ...	1	5	6½	33/9	—	3 17 0

MANUFACTURING COMPANIES.

Aron Electricity Ord.	1	10	15	3	– 3/8	5 0 0
Assoc. Elec. Ord.	1	4	6	35/–	+2/3	3 8 7
Do. Prf.	1	8	8	37/6	—	4 5 4
Babcock & Wilcox	1	6	8	49/–	+6d.	3 4 8
British Aluminium Ord.	1	5	7½	41/–	+2/3	3 13 2
British Insulated Ord.	1	5	15	4½	—	3 9 9
Brush Ord.	Stock	Nil	Nil	48½	—	—
Callender's	1	15	15	3½	—	4 0 0
Do. 6½% Pref.	1	6½	6½	31/3	—	4 3 2
Crompton Parkinson Ord. ...	5/–	—	12½	3 3/8	– 1/8	1 1 2
Do. 8% Pref.	1	8	8	36/3	—	4 8 5
Edison Swan 1st Pref.	1	7½	7½	27/6	—	5 9 0
Electric Construction	1	Nil	3½	23/–	—	3 0 10
Enfield Cable Ord.	1	25	25	5½	—	4 17 6
English Electric	1	Nil	Nil	16/3	+6d.	—
Do. do. Pref.	1	Nil	Nil	1	—	—
Ever Ready	5/–	35	35	21/6	—	8 2 10
Ferranti Pref.	1	7	7	28/3	+9d.	4 19 0
G.E.C. Pref.	1	6½	6½	35/–	—	3 14 4
Do. Ord.	1	8	10	57/6	–1/–	3 9 7
Henley's	1	30	30	6½	–½	4 8 3
Do. 4½% Pref.	5	4½	4½	5½	—	3 16 8
India-Rubber Preferred	1	—	5½	1½	—	4 17 9
Johnson & Phillips	1	5	7½	40/–	—	3 15 0
Siemens Ord.	1	6½	4	1 3/8	—	3 7 5
Telegraph Construction	£1	Nil	Nil	1½	+ 1/8	—

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1933

24357. "Variable inductances suitable for the tuned high-frequency circuits of wireless receiving apparatus." W. J. Polydoroff and Aladdin Industries, Ltd. September 2nd, 1933. (429826.)

26464. "Potential changers." P. R. Mallory & Co., Inc. September 27th, 1932. (429671.)

27577. "Electric lamps." British Thomson-Houston Co., Ltd., L. J. Davies, C. Gilson and W. J. Scott. October 6th, 1933. (429750.)

30713. "Methods of and apparatus for determining the electrolytic condition of an animal body." F. C. Ellis. November 4th, 1933. (429595.)

31490. "Television and like systems." T. M. C. Lance, D. M. Johnstone and Baird Television, Ltd. November 11th, 1933. (429832.)

33744. "Electrically heated percolators." G. H. Collins and H. F. Collins. December 1st, 1933. (429600.)

33897. "Synchronised electric drives for printing presses and like machines." British Thomson-Houston Co., Ltd. December 2nd, 1932. (429837.)

33961. "Pressure operated electric switches." W. W. Triggs (C. A. Dunham Co., Ltd.). December 2nd, 1933. (429684.)

33981. "Electromagnetically operated mercury switches." F. M. Hammond. December 4th, 1933. (429758.)

34022. "Joints for h.v. electric cables." Standard Telephones & Cables, Ltd., and J. K. Webb. December 4th, 1933. (429611.)

34206. "Television apparatus." Marconi's Wireless Telegraph Co., Ltd., H. M. Dowsett and L. E. Q. Walker. December 5th, 1933. (429690.)

34288. "Lighting fittings." J. Keene and Benjamin Electric, Ltd. December 6th, 1933. (429762.)

34341. "Telephone systems." Automatic Electric Co., Ltd., R. Taylor, and G. T. Baker. December 6th, 1933. (429767.)

34454. "Seals for electric cables." British Thomson-Houston Co., Ltd. December 7th, 1932. (429771.)

34461. "Electrodes for electric cells." Ferguson Battery Co., Ltd., J. R. Bayes, E. H. Sulman and N. W. Russell. December 7th, 1933. (429840.)

34694. "Electric converting systems." British Thomson-Houston Co., Ltd. December 9th, 1932. (429772.)

34944. "Moving-coil loudspeakers." B. Dempster and Magnavox (Great Britain), Ltd. December 12th, 1933. (429624.)

35589. "Potheads for electric cables." Okonite-Callender Cable Co., Inc. December 16th, 1932. (429775.)

36379. "Vibratory electric motors." W. H. Young. December 27th, 1933. (429781.)

36648. "Electrical distributive circuits." Naamlooze Vennootschap Machinerieen-en Apparaten Fabrieken (Meaf). January 3rd, 1933. (429783.)

1934

285. "Electrical distribution fuse-boards." S. E. Sheerman, F. R. Pendergast and United Electrical Co. (Birmingham), Ltd. January 4th, 1934. (429784.)

298. "Telephone systems." General Electric Co., Ltd., and J. E. Collyer. January 4th, 1934. (429848.)

457. "Thermionic valve and like circuits." Standard Radio Relay Services, Ltd., G. M. O. Jenkins and P. Adorjan. January 5th, 1934. (429630.)

716. "Electron-discharge devices." C. S. Bull and S. Rodda. January 8th, 1934. (429631.)

873. "Electrodes of electrolytic cells." A. E. Knowles. January 10th, 1934. (429633.)

1624. "Variable electrical condensers." A. C. Cossor, Ltd., and D. G. Rennett. January 16th, 1934. (429785.)

2089. "Electric imitation fires." F. H. Smith. January 20th, 1934. (429787.)

3991. "Hot-cathode vapour lamps." Siemens Electric Lamps & Supplies, Ltd., and J. N. Aldington. February 7th, 1934. (429638.)

5441. "Manufacture of electric motors with fluid-tight windings." J. Sigmund and F. Sigmund (trading as Sigmund Pumpy Bratri Sigmundove). February 20th, 1933. (429641.)

8644. "Cathode-ray tubes." J. D. McGee and G. E. Condliffe. March 19th, 1934. (429854.)

8735. "Electrical recording and indicating devices." Callenders' Cable & Construction Co., Ltd., and W. C. Crocker. March 20th, 1934. (429855.)

9167. "Coil assemblies for wireless and like purposes." General Electric Co., Ltd., and F. R. Jones. March 23rd, 1934. (429800.)

9878. "Production of magnetisable elements such as cores and the like for electrical purposes." Siemens & Halske Akt.-Ges. March 31st, 1933. (429802.)

10103. "Electrically heated cushion covers, mats and the like." G. Kindermann. April 1st, 1933. (Cognate application, 10104/34.) (429857.)

11671. "Contacts for electric fuses, switches, or the like." Siemens Bros. & Co., Ltd., and H. G. Wood. April 18th, 1934. (429806.)

16834. "Fluid-tight windings for electric motors." M. Sigmund. June 7th, 1933. (Cognate application 16835/34.) (429656.)

20626. "Electric incandescent lamps having at least one screened filament." Lampe Yvel, Auto-Lampe & Cie., Anciens Etablissements L. Levy et A. Monnier. July 18th, 1933. (429660.)

21570. "Ultra-short wave tubes." Naamlooze Vennootschap Machinerieen-en Apparaten Fabrieken (Meaf). July 21st, 1933. (429863.)

22251. "Electric hand lamp." J. Krös. January 2nd, 1934. (429864.)

22912. "Electrical condensers." Dubilier Condenser Co. (1925), Ltd. August 8th, 1933. (429716.)

26667. "Electric-discharge devices." General Electric Co., Ltd. September 23rd, 1933. (429872.)

26829. "Photo-sensitive electric-discharge devices and circuit arrangements incorporating the same." Marconi's Wireless Telegraph Co., Ltd. September 19th, 1933. (429725.)

26830. "Photo-electric cells and circuit arrangements incorporating the same." Marconi's Wireless Telegraph Co., Ltd. September 27th, 1933. (429726.)

27122. "Regulating or relay devices for use with control systems." Electrofio Meters Co., Ltd. (Republic Flow Meters, Inc.). September 20th, 1934. (429727.)

27656. "Electrical insulators." Steatit-Magnesia Akt.-Ges. September 27th, 1933. (429730.)

28193. "Cooling means for metal-vapour arc-convertors." English Electric Co., Ltd. December 9th, 1933. (429731.)

28685. "Electric insulator supporting-pins." F. P. Sexton. October 6th, 1934. (429874.)

31396. "Electric wiring and moulding systems." R. L. Ravison. May 11th, 1934. (Cognate application 31397/34.) (Addition to 422239.) (429735.)

33049. "Rectifying arrangements for supplying radio apparatus." British Thomson-Houston Co., Ltd. November 16th, 1933. (429882.)

33244. "Ceramic covering for electrical flat-irons." Stotz-Kontakt Ges. November 18th, 1933. (429738.)

35040. "Manufacture of containers for the use of storage batteries, electric accumulators and secondary cells." K. A. Hillyers. December 6th, 1934. (429885.)

35215. "Electric lamps." British Thomson-Houston Co., Ltd. December 8th, 1933. (429886.)

35815. "Recording and reproduction of acoustic vibrations." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. December 15th, 1933. (429740.)

37029. "Telephone systems." General Electric Co., Ltd., and J. E. Collyer. January 4th, 1934. (Divided out of 429848.) (429891.)

1935

3307. "Telephone systems." Automatic Electric Co., Ltd., R. Taylor and G. T. Baker. December 6th, 1933. (Divided out of 34341/33.) (429822.)

5731. "Electric measuring devices." British Thomson-Houston Co., Ltd. February 23rd, 1934. (429903.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from June 26th:—

Aladdin. No. 548230. All goods in Class 6.—Aladdin Industries, Ltd., Aladdin Building, Greenford, Middlesex.

Astra. No. 558843. Class 6. Electric fans.—Marelli, Ltd., 19-20, Garlick Hill, Queen Victoria Street, E.C.4.

Cinesonor. No. 554896. Class 8. Sound recording and reproducing apparatus, &c.—Philips Lamps, Ltd., 145, Charing Cross Road, W.C.1.

Wayfarer. No. 560414. Class 8. Wireless receiving sets alone or in combination with gramophones and parts thereof, thermionic valves and loud speakers.—The High Vacuum Valve Co., Ltd., 113-117, Farringdon Road, E.C.1.

Faradyne. No. 559309. Class 11. Electrical massage apparatus.—Sydney Edward Wise, 126, High Street, Peckham, S.E.15.

Terralux. No. 560360. Class 13. Lamps for vehicles.—The Patent Lighting Co., Ltd., Eden Works, Uxbridge Road, Hayes, Middlesex.

Megacite. No. 559476. Class 50. Electrical insulating materials of synthetic resin, condensation products of phenol and formaldehyde, casein or bitumen, and articles made therefrom.—British Television Supplies, Ltd., Bush House, Aldwych, W.C.2.

Siamese Electrical Imports

DEALING with the import trade during 1933-34 of Siam in their report to the Department of Overseas Trade on the economic conditions in Siam (Stationery Office, 1s. 9d. net), Mr. J. Bailey, Hon. Consul-General at Bangkok, and Mr. R. Whittington, British Vice-Consul, Bangkok, state that it was about half of the average value for the four years ended 1929-30. Imports from the United Kingdom decreased in 1933-34 by approximately Ticals 1.4 millions (Ticals 11=£1), as compared with the previous year, although there were slight improvements in machinery and vehicles. The preponderance of Japanese goods in the import market was the outstanding feature of the period under review. The imports of electrical goods and apparatus, including machinery, decreased from Ticals 1,883,839 to Ticals 1,481,506, but the decrease was borne almost entirely by Denmark, whence in the two previous years the State Railways of Siam had imported a number of Diesel-electric locomotives. Direct United Kingdom imports improved in value from Ticals 152,123 in 1932-33 to Ticals 248,644 in 1933-34. In the same period direct imports from the United States declined from Ticals 403,507 to Ticals 280,527, while imports from Japan increased from Ticals 105,602 to Ticals 202,457. The bulk of smaller electrical domestic appliances are imported from Japan and China, and many of the better-class lines come from the United States. Japanese radio sets find a steady market, and are mainly for local reception, while a certain number of American instruments are also sold. For long-distance reception Dutch products have found the readiest sale, both on grounds of price and suitability to local conditions. Sets from the United Kingdom are considered too expensive and their output too small. Conditions, moreover, for the reception of broadcast programmes from European and American stations in Bangkok are poor, and there is little incentive to buy expensive receiving apparatus.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aylesbury.—Houses (186), Bicester Road, electrical work; H. C. Janes, Ltd., builders, Park Way, Luton.

Ayrshire.—Rebuilding Irvine schools (£22,000); county architect, Ayr.

Barking.—Extension to factory, River Road; Barking Zinc Oxide, Ltd.

Bexhill-on-Sea.—Houses (29); borough surveyor.

Bingley.—Houses (84), Gilstead Estate; U.D.C. surveyor.

Birmingham.—Cinema, Alcester Road, Maypole; A. E. Turner, builder, Brueton Avenue, Solihull. Factory for the Chad Valley Co., Ltd., Harborne, Birmingham, 17.

Blaydon-on-Tyne.—Houses (68); N. T. Barker, builder, Winlaton Mill.

Brighton.—Houses (40), Ladies' Mile Estate; Ladies' Mile Estate, Ltd. Front elevation and canopy, Palladium Cinema, King's Road; Odeon (Brighton), Ltd. News cinema, café and shops, 14-18, West Street; General Cinema Theatres, Ltd.

Bristol.—Cinema, Hanham Road (£25,000), electrical work; L. W. Barnard & Partners, architects, Cheltenham.

Bursiem.—Extensions to Albion Works, Navigation Road; W. R. Midwinter, Ltd.

Caernarvonshire.—Bangor Girls' County School; W. L. Jones, county architect, Caernarvon.

Chatham.—Houses (80) and bungalows, Great South Estate; borough engineer.

Cockfosters.—Houses (32), Freston Gardens; Francis W. Walker, The Broadway, N.3.

Croydon.—Schools, South Norwood (£25,000); director of education.

Denton (NEAR MANCHESTER).—Houses (36), Melton Avenue; F. Riley & Sons, builders, 59, Forge Lane, Bradford.

Dover.—Houses (102), St. Radigund's Road Estate; borough surveyor.

Droylsden.—St. Stephen's Church; R.C. Authorities.

Durham.—Houses (54) for the Durham County Agricultural Committee; W. J. Merrett, county surveyor.

Ealing.—Blocks of flats, Helena Road, Mount Avenue, &c.; Minoprio & Spencely, architects, 18, Seymour Street, W.1. Dance hall and shops, Uxbridge Road; Howis & Belcham, architects, 9, Fenchurch Street, E.C.3.

Easington.—Pithead baths for the Miners' Welfare Committee (£40,000); Gordon Durham & Co., builders, East Boldon.

Edinburgh.—Furniture showrooms, Bread Street, for St. Cuthbert's Co-operative Association; T. P. Marwick & Sons, architects, 54, Northumberland Street. School for physical defectives, Merchiston Castle; E. J. MacRae, city architect.

Eston.—Cinema, Grangetown Garden Village Estate; U.D.C. surveyor.

Flintshire.—Central schools, Ernest Street, Rhyl; R. G. Whitley, county architect, Mold.

Forfar.—Extensions to Fever Hospital (£25,000) for the Public Health Committee of Angus; the Medical Officer of the County, Forfar.

Gainsborough.—Houses (52), Wilson Street; H. Dorrington & Son, builders.

Guildford.—Enlargement to Westborough School and clinic and welfare centre, Stoughton, for E.C.

Hanley.—Houses (262), Townsend Estate, Bucknall; C. Cornes & Son.

Harrow.—Shops, flats and garages, between Camrose Avenue and Bacon Lane; Roberts & Reeves.

Hastings.—Cinema (£60,000), St. Leonards-on-Sea, for Eldorado Cinemas, Ltd.; Brettenham House, Lancaster Place, London, W.C.2.

Hemsby.—Gelatine works, Lower Rake Lane, for G. E. Shawcross.

Hertfordshire.—Grammar school, East Barnet (£30,093), for County E.C.

Hexham (NORTHUMBERLAND).—Houses (118); H. E. Pitt, Ltd., builders, Leopold Street, Millfield, Sunderland.

High Wycombe.—Houses, Desborough Castle Estate, Wycombe Marsh area and Beech Road; borough surveyor. Factory, Chapel Lane, for P. B. Powell.

Hipperholme.—Houses (32), Bailiffe Bridge, for W. G. Brown, Ltd.

Hoole.—Houses (60); Mr. Sumner, builder.

Hyde.—Houses (60), near Joel Lane, Werneth Low; F. Booth & Sons, builders, Rowbotham Street, Gee Cross.

Kettering.—Extensions to factory, Union Street; Patrick, Ltd.

Kirkcaldy.—Houses (592); burgh surveyor.

Lancashire.—Grammar School, Whitefields, and Infants' School, Flixton; S. Wilkinson, architect, County Offices, Preston.

Lancaster.—Amusement Centre near the Coastal Road, Hest Bank; C. B. Pearson & Son, architects, Dalton Square.

Leatherhead.—Houses (182), Fortyfoot Road; C. H. Runnells, Grove Road, Sutton. Houses (218), Yarm Court Estate; Osenton & Co. Reconstruction of sewage disposal works (£25,269); U.D.C. surveyor.

Leicester.—Swimming baths, St. Nicholas Street; Baths Committee.

Leominster.—Houses (32); H. Tomkys, borough engineer.

London.—(E.C.).—Buildings, for Associated Newspapers, Ltd., Carmelite Street, and Victoria Embankment; Trollope & Colls, Ltd., 5, Coleman Street, E.C.2. (PADDINGTON).—Flats and shops, Maida Vale, Andover Place, and Kilburn Park Road; Caroe & Passmore, 3, Great College Street, S.W.1. (SOUTHWARK).—Dwellings, Donnington Grove (£23,864): Henry Boot & Sons, Ltd., 10, The Boltons, S.W.10. (STREATHAM).—Central school, Furzedown site; L.C.C. architect. (WESTMINSTER).—Clinic and day nursery, Bessborough Street (£45,000); F. Milton Harvey, architect, 3, Raymond Buildings, Gray's Inn, W.C. Shops, &c., with underground garage, Horseferry Road; E. Howard & Partners, 3, St. James Street, S.W.1. (WOOLWICH).—Tenements, Middle Park Estate (£30,257); borough engineer.

Luton.—Houses (170), for Luton Garden Estates, Ltd.

Maidstone.—Houses (251), Cherry Grounds Estate, Loose Road, for O. K. Whatley.

Manchester.—Houses (33), Benbury Avenue, Forshaw Avenue, Harrop Street, Gorton; Midgley Bennett & Forshaw, 16, Deansgate, Manchester. Houses (60), Moss Nook, Styal Road, for H. Ratcliffe; H. Hankinson, architect, 3, The Downs, Altrincham. Houses (30), Oaklands Road and Oaklands Drive, Northenden; G. Preece, builder, 128, Broadoak Road, Northen Etchells. Houses (31), Park Road and Cranxton Grove, Northen Etchells; A. Whittaker, builder, Park Road, Northen Etchells. Houses (90), Roundwood Road, Norleigh Road, Shawdene Road, Dronfield Road, Northenden; Houselet Development Co., Ltd., builders, 1, Penarth Road, Northenden. Houses (44), near Russell Road, Blackley, for the Lynn Estate, Ltd.; J. R. Gradwell, architect, 17, St. Ann's Square. Houses (37), Whitemoss Avenue and Chatham Road, Chorlton-cum-Hardy; W. Gaffney, builder, 47, Edge Lane, Stretford.

Mansfield.—Houses (48), Big Barn Lane; Real Estates (Doncaster), Ltd. Houses (22), Forest Road, for T. Fletcher.

Meir (STAFFORDSHIRE).—Houses (30), near South Walk; H. Beckett.

Middlesbrough.—Houses, Marton Road, for Emerson and Tollesby, and garages, Newport Road, for J. Coull, Cambridge Avenue, Linthorpe, and A. A. Harvent, The Grove, Marton; Kitching & Co., architects, 21, Albert Road, Middlesbrough.

Middlesex.—Schools, Kenton, Potters Bar, and Staines, also extensions to Southville School, Feltham; county architect, 10, Great George Street, London, S.W.1.

Newbury (BERKSHIRE).—Houses (22), Thatcham, for Houghton & Palmer, builders, Benham Hill.

Newcastle-on-Tyne.—School, High Heaton; T. Walling, director of education, Northumberland Road. Schools, Liverpool Street, for the managers of St. Andrew's schools; J. R. Rutherford & Sons, builders, Minories Joinery Works.

Northfleet.—Houses (28); U.D.C. surveyor.

Northolt.—Development of Lime Trees Estate with cinema, church, hall, &c.; Henry Boot, Ltd.

North Shields.—Cinema, North Chirton Estate; J. Dixon, builder, 33, Lynn Road.

Oldham.—Houses (30), Windmill Estate, Broadway, Royton; Schofield & Thompson, builders, Hartley Street.

Ormskirk.—Houses (120), Broadwood Park Estate, Northway, and Wood End, Maghull, for Coulters, Ltd.

Orrell.—Houses (71), near Orrell Road, for Clough & Garkell, builders, Pemberton.

Padiham.—Council offices and assembly hall, Burnley Road; Bradshaw, Gass & Hope, architects, 19, Sulverwell Street, Bolton.

Perivale.—Health centre; borough engineer.

Ryton (CO. DURHAM).—Houses (56); R. Carse & Sons, builders, Amble.

Salford.—Schools, Eccles New Road district (£75,000); J. A. Hartley, director of education.

Seaford.—Cinema and dance hall, Pelham Place; U.D.C. surveyor.

Sedbergh.—Houses (36), Howgill Lane; Baines & Son, builders, Kendal.

Selly Oak (BIRMINGHAM).—Modernisation, Oak Cinema; Associated British Cinemas, Ltd.

Shrewsbury.—Houses (40); John C. Vaughan & Son, builders, Oswestry.

Slough.—Houses (21), Croft Hill Estate, for W. Herbert. Houses (20), near Cippenham Lane, for E. McAll.

Southam.—Houses (24), Harbury; F. W. H. Lee, architect, 11, Waterloo Place, Leamington Spa.

Southampton.—Forum Cinema; borough surveyor.

Southend-on-Sea.—Church, for Southchurch Park Congregational trustees; Rev. S. E. Mowforth, pastor.

South Shields.—Senior school, Cleadon Park, for E.C.; Page, Son & Bradbury, architects, 67, King Street, South Shields.

Stirling.—Houses (50), Linden Avenue; city surveyor.

Stoke-on-Trent.—Houses (33), near Occupation Road; E. Lawton.

Sutton Coldfield.—Houses (52), Corporation Estate; borough engineer. Premises, Birmingham Road, for Birmingham Municipal Bank; H. W. Weeden, architect, 84, Colmore Row, Birmingham.

Taunton.—Houses (100), Halcon Estate; I. F. Shellard, borough engineer.

Thatcham (BERKSHIRE).—Houses (22), near Bath Road; Houghton & Palmer.

Thornaby-on-Tees.—Public baths, Thornaby Road; borough surveyor.

Tottenham.—Houses (50), Weir Hall Estate; borough engineer. Club room and ice hockey stadium, Harringay Stadium; Greyhound Racing Association, Ltd.

Walsall.—Houses (30), Holly Fields Estate; Cooper & Harvey, builders, 33, George Street.

Wavertree.—Holt High School (£50,233); Henry Boot & Sons, Ltd., builders.

Wellington.—Houses (52), Hadley Park Road; J. H. T. Hickman, architect, 1, Market Street, Wellington.

West Riding.—School (480 places), Castleford; director of education, Wakefield.

Wirral (CHESHIRE).—Houses (22), Heswall; U.D.C. surveyor.

Woking.—Cinema (2,000 seats), Chobham Road; Allied Kinemas, Ltd.

Wolverhampton.—Houses (250), the Scotlands and Low Hill Estate; H. B. Robinson, borough surveyor, Town Hall.

Wombwell (YORKSHIRE).—Houses (44) and bungalows; U.D.C. surveyor.